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A PRACTICAL BOOK
ON
BIRTH CONTROL.

By

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MRS. ANIE MATHEWS,

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FOREWORD.

By

B. V. Jadhav, M. L. A.,

1. I was surprised to receive a letter from Mrs. Mathews of Travancore, asking me to write an introduction to the second edition of her book on Birth Control.* We had never heard of each other; and I was wondering why her choice had fallen upon me, when she had a number of eminent and learned men to choose from nearer home. Going over her letter again, my doubts were set at rest. She had heard about my attempts to introduce in the Legislative Assembly a bill to legalise abortion at the hands of qualified medical practitioners on account of "Social, Physical and Economic reasons". Birth Control and Abortion are allied subjects; and therefore she considered me fully qualified for the work.

2. In these days very few, except the orthodox among the Hindus and the Roman Catholics amoug the Christians, speak against birth control. But even these are convinced of its necessity, to

avoid unwanted pregnancy. But many a time plans of men fail: sometimes the means of prevention are not at hand, or the sexual act is against the will of an unfortunate woman, and undesired conception may take place. On such occasions she should be allowed to get rid of the foetus. So the right to abort is just complimentary to the right to prevent conception. The latter is not complete without the former. The two together are necessary to avoid unwelcome motherhood. When birth control fails, abortion is the second line of defence.

3. The eminent doctor, who wrote the book but chose to remain incognito, and Mrs. Mathews the publisher deserve to be congratulated on the excellence of the book. The few opinions of the eminent men and women that were sent to me also bear testimony to its high merit. The book has, it is evident, received well-merited public support. It was published on the 1st June 1933 and within only fourteen weeks Mrs. M. informs me that the second edition is being prepared, and will be released from the press next month. It is obvious that the book has met a real want.

4. I have read several books on birth control. In most of these, the major portion is taken up in discussing the evils of over-population and the merits of birth control and in refuting

the objections that are likely to be advanced against it. The present book is free from all prolixity in this respect. Every page gives useful information and ought to be carefully digested.

5. The first chapter— Introduction—contains only nine pages. In the first two of these an illustration of a skilful gardener is given, to show how he tends the vine and how he raises oak trees. He plucks the blossom of the tender vine in order to give it time to grow and in the case of the oak he keeps only the robust seedlings and destroys all others. He asks a very pertinent question; "If this could be with the lowest form of life in nature, how much more should it be with the highest?" There can be only one answer to this question. In the case of human beings it is necessary to practise birth control when the mother is not fully developed, especially in India, where girls are married and motherhood is forced upon them. It is also necessary in the case of fully grown up women to secure proper spacing between two births. The importance of birth control is also shown by two photos: the frontispiece and plate No. 1. The perusal of the brief notes accompanying them and the pitiful faces of the members of the family bring home to the reader the conviction that timely practice of birth control in these families would

have made all of them happy and hopeful instead of miserable and wretched, both in mind and body. In a few pages is given the past history of the movement and the organisations that are at present carrying it on in various countries.

6. Chapters II and III give the anatomy and the physiology of the sex organs and chapter IV the physiology of fertilization. The information given in these chapters is very valuable and ought to be made available to every grown up boy and girl. False notions of decency and prudery have taught parents to withold this knowledge from their children. But their desired object is frustrated, and hardly two per cent of the young folks can be kept totally ignorant. Their curiosity makes them enquire and they get knowledge which many times is inaccurate and mischievous. The information given in the three chapters is sure to benefit the young generation.

7. Knowledge of the subject matter of the first three chapters is necessary to enable a layman to examine for himself the merits and demerits of any method of preventing conception. Some of the books I have read give a few methods only, critcise and show how unreliable all of them except the one they recommend are, and tell how to get the necessary articles. The present book is a notable exception. It

gives all the known methods arranged scientifically under different chapters, and tells us what experiments are being conducted by the learned author. The meeting of the ovum and the sperm in the ovary or in the fallopian tubes leads to conception. The sperm is active enongh to move up the cervix and pass through the uterus even as far as the fallopian tube and sometimes further in search of the ovum. It is enough for the purpose of Birth Control to prevent this meeting.

8. The different methods are given under six headings. (1) Surgical, (2) Autocontraceptive, (3) Mechanical, (4) Therapeutic, (5) X-ray and Radium, (6) Most modern. Of these the first are for the rich. Vasectomy ought to be made available even to the poor; and should be made compulsary in the case of mental defectives and tuberculous. It is noteworthy that the first dictator of Germany has passed a law to this effect and his example will soon be followed by others. Those under the second heading do not involve any expense; but success from them is uncertain. Those classed under the third heading namely the Mechanical, deserve consideration. Some of these are costly and some are very cheap to suit any purse. Some of the methods classed under the

fourth heading are also available to the poor as they do not cost much. Those under the fifth and sixth headings are costly and have not emerged completely from the experimental stage.

9. Chapter XI. Interruption of pregnancy, briefly gives the present law about abortion by a qualified medical practitioner. A number of diseases such as tuberculosis, heart disease, diseases of the liver, kidney, brain, uterus, pelvis, etc., in which there is danger to the life of the prospective mother are described in which it will be within the law for a medical man to cause an abortion to save her life. There is a good deal of ignorance among the doctors on this subject. Some do not even know what they can do in such cases. The information is very useful both for the layman and a doctor.

10. The last chapter gives a few statistics about infant mortality in relation to the income of the parents. It also gives a short resume of the methods of birth control and examines them briefly.

11. The book is very useful to all especially in these hard times. The population of the country as a whole is more than can find remunerative employment and a large proportion of them are at most half fed. Too many children in the case

of the poor is a calamity; in the case of the middle class it leads to the lowering of the standard of living and prejudices the education of all. The book should be made available to all sections of the community; a cheap edition will be a great boon. It should also be translated into all the principal vernaculars of the country. In this way the poor women who are the worst victims of the present system will come to know how to avoid unwanted babies; how to secure proper spacing and when to stop adding to the population. The eminent doctor has led the people under a load of obligation and every one who reads the book will desire to know his name to offer him their grateful congratulations.

B. V. Jadhav, M. L. A.
Simla.

PREFACE.

I have great pleasure in publishing this book, as I think that, next to religious books, this will have the greatest practical use to the world at large. Having seen the pitiable state to which many of my friends have been driven, through their ignorance regarding the proper spacing of children, several years ago, I suggested to the author of this book that a production of such a kind will be a great piece of social and humanitarian service. Ever since, he has been collecting facts, investigating and experimenting with this view in mind. Not only that I set him on a new line of enquiry, but kept on helping him to persue it.

Many a stalwart girl, healthy and sporting in her school days, has been transformed into frail weakling, after a series of about a half a dozen quickly following pregnancies. The metamorphosis seems to be strange. But fact was there staring me in the face. An enlightened lady, an old acquaintance of mine brought forth eleven children in thirteen years, and death cut short her career at the last of the amazing event of her life. Many might refuse to believe it, but it is not a story.

On behalf of the Indian women, whose humble representative I am, I wish to thank the doctor for spending his time, thought and energy for the purpose for affording assistance, through knowledge to womankind to control their lives and thus the destinies of the generations that are to be born of them. I deem it a privilege in being enabled to publish it for the benefit of my sisters.

In this connection, with great pleasure, I would point out that the All India Women's Conference at Calcutta and the All India Medical Conference at Bombay, held during the last week, have passed resolutions in favour of birth control propaganda.

Finally, I would heartly thank the venerable personages, Mrs. Sarojini Naidu, Dr. Mrs. Muthu Lakshmi Reddi, and Mrs. Edith How-Martyn (Director of Birth Control International Information Centre, London), for encouraging me by their kind appreciations; and Mr. B. V. Jadhav, M. L. A, for his ready and timely help by writing a foreword to this.

A. M.
Jan. 2nd. 1934.

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Frontis-piece.

. Frontispiece.

Narrow spacing of children.

Six children in seven years. Note the healthy stalwart figure of the father with discontented features; the debilitated mother; and the frail children. A photo of the mother if taken five or six years before, would have shown the great difference between a young healthy, blooming country beauty then and the half-starved careworn specimen of a woman now.

CHAPTER I.

Introduction.

"**The** treasures of the deep are not so precious,
As are the concealed comforts of a man,
Locked up in woman's love".
"What a delicious breath marriage sends forth!
The violet's bed is not sweeter".

To have the fullest enjoyment of and the best happiness in married life, the couple must keep up their health as long as they live. When once either of them, or one of the fruits of their sexual life wane in health, family happiness diminishes at least for the time being. Hundreds, there are, who are not able to keep up this happiness on account of the contracted ill-health in one or other of the members of their fold. Ill-health can be reduced to a minimum if certain principles are followed in the sexual life of the married couple. "Prevention is better than cure".

The aim of this book is to show the several ways by which some of the causes which lead to unhappiness in family life, may be thwarted by intelligent precautionary means.

"As the vine which has long twined its graceful foliage about the oak, and been lifted by it into sunshine, will, when the hardy plant is rifted by the thunderbolt, cling round it with its caressing tendrils, and bind up its shattered boughs; so it is beautifully ordered by Providence, that woman, who is the mere dependent and ornament of man in his happier hours, should be his stay and solace when smitten with sudden calamity; winding herself into the rugged recesses of his nature, tenderly supporting the drooping head, and binding up the broken heart".

But, if the vine flowers too early, all its fruits ripe, its leaves wither immaturely and drop down, its tendrils get dry, buds pale, branches are stunted, and the main stem itself is shrunken, of what use can it be to the oak? In fact, both the oak and the vine will be struck down by the slightest blast. Not very different is the fate of human beings in this respect.

A further lesson can be deduced from nature. Thousands of acorns are produced by an oak every year. Yet how few seedlings grow out of them! How fewer still are the young plants that are selected out of the germinating seedlings, and enabled to grow up into fullgrown oaks. Does not the good gardener clear off the thick growth of the seedlings, leaving a few sturdy ones? Does he not then arrange these selected ones at proper distances in his limited space of land, and sell away or destroy the excess of even the selected of his pretty little oaklings? If this could be with the lowest form of life in nature how much more should it be in the case of human beings?

Malthus was the first man who warned the world, in his "Essay on population", published in 1798, on the dangers of uncontrolled population. Though considerably criticised in his methods of arguments, his main position could not be assailed. Arising out of its various speculations on the future of mankind, if allowed to multiply unchecked by war, famine and disease which progress in civilisation naturally discounted were started. "Man stands today at the parting of the ways", wrote Edward East, "with the choice of controlling his destiny or of being tossed about until the end of time by the blind forces of environment in which he finds himself!"

In 1877, "The Malthusian league" was started in England for the propagation of his principles for the limitation of population. But its members did not believe in the possibility of practice of continence, for which purpose Malthus preached, and advocated artificial methods. Hence they were called Neo-Malthusians, and the name of the association was changed to "The New Generation League?" of which the venerable C. Y. Drysdale is the present chairman. In its mission, it was helped by an unexpected incident which is epoch-making in the history of the world.

In 1833, a book called "Fruits of philosophy" was published by Dr. Charles Knowlton of Boston, in which artificial methods of contraception were freely discussed. For 40 years it had on without creating any fuss. Then an over-zealous person wanted to satisfy his conscience about this immoral book; got a bookseller in Bristol who was distributing this pamphlet, prosecuted and convicted. The poor bookseller obtained his release by apologising and binding himself to withdraw the book from circulation. This brought into the field the venerable Mrs. Anie Besant and her colleague Mr. Charles Bradlaugh, the daughty champions of the freedom of thought and of humanity. They published the book and circulated it on their own authority, were prosecuted by the Government in England, made a magnificent defence in the cause of human freedom and its right to better its own conditions; and though the case was lost in the original court, in appeal Mrs. Besant won and all the confiscated copies were returned. The trial proved a splendid piece of unintended piece of propaganda for the cause of birth control and the momentum thus gained has kept on the movement, gathering strength and support from all quarters, till it has become at the present time a world-problem on the basis of which the future of humanity is being speculated upon in its constructive and synthetic significance, including the spiritual implications of it.

There are some even now, who would say that the sperm in us has life, and to destroy it is equal to homicide. If that were so, every cell has life and to cut away any cell would be committing homicide. And how many living cells do we (doctors) cut away during surgical work to give better life for the remaining cells? How many living cells die daily after the overflow of the semen from those who do not have sexual union, and how many more of the same kind end their lives after the ordinary sexual union? Do all the living ova that come into the uterus month after month get fertilized? They all end their lives unknown and unheard of by their would-be mates.

The question before us is whether it is immoral, or irreligious, to prevent the meeting of these mates, the ova and the spermatozoa. Think of the consequences, if all these living organisms were to fertilize, and grow up. Human beings will increase like flies and mosquitoes, and be a pest over this world. Surely, God could not have meant them to multiply in this way. Hence so many natural hindrances for such overwhelming increase.

Hundreds of natural ways and means are found out and improvements are being made upon them by man to suit his own comforts and conveniences. But none of them are considered irreligious. With all the unchristian Bolshevism of Russia, they seem to thrive far better in this world at present than any other nation. All the other empires fear the Russians would within a few years dominate their cultures and commerce.

I am not an antichristian, neither am I an atheist, nor a Bolshevist, but I would gladly submit to reason and all those who are reasonable would see some of the most rational principles stated in the following pages of this book, which will point the way to improve the social conditions of humanity.

All religions are improved upon by man.

Each great man expresses a new view. His satellites spread it all over the country. Their followers take it as God-given. The view becomes a social or religious principle. To speak, write or ask against this principle is considered a great sin, and he who does it will be labelled as irreligious. If the Pope of Rome today say, that, adopting contraceptive methods is not against religion, and that, on the other hand (careful and proper use of the best and most improved devices of prevention of the fertilization of the human ova) helps to improve mankind, tomorrow it will be followed as a religious injunction. The Lambeth Conference of the Anglican Bishops in 1930 has passed resolutions in favour of the use of contraceptives. The Methodist Episcopal church has endorsed the same.

"The English church congress has approved of it in certain conditions, and now a princess of the Royal blood has become a patroness of a Malthusian Ball. An English Bishop and a Judge have specially recommended birth control. Our land is greatly over-populated, and the outlet by emigration is almost closed. Fortunately our birth-rate, except that of Sweden, is now the lowest in Europe, and as soon as its diminition continues, our population will decrease, whereas that of the world as a whole is increasing, at the rate of 29 millions a year, notably in China, India, and Russia."

Clinical Journal, April 1933.

Now let us see what are the causes and conditions that necessitate us to adopt contraceptive methods.

Various reasons may be cited to convince any orthodox, even of the most conservative sort of mentality, if only he or she would listen to reason.

The world is going forward. Formerly, woman was considered only as an ornament at home. But now, she has to work for her own livelihood. A large percentage of the coolies working in the factories etc. are women. Pregnancy and its consequent troubles will be a great handicap to such people. Apart from their own difficulties, the children born to them cannot be well looked-after on account of the want of time and money. Thus, the offsprings of these poor labourers get ill-nourished and degenerate, and as such, many of them become a curse to society. (See the frontispiece and fig. 1, and note the details regarding them). Either they die prematurely, or lead a crippled and cursed life. The health of the ordinary mothers themselves gets shattered due to constant conception and repeated child-bearing. Much more it is in the case of women

Fig. 1.

The child at the top is 18 months old. He has an younger brother five months old and his mother is three months pregnant. The child was weaned after six months and fed on cheap starch diet. Note the emaciated condition with the puffiness of the eyelids, face and feet, indicating that his end is near. He died a week after taking this photograph.

The one in the lower figure is the 13th child of an unhappy mother who met her death soon after delivery. The father, who earns a little less than 4 annas a day by hard labour endeavours to keep up the child by cheap starchy foods. Hence the rickety condition. It will not be many days before it follows the mother.

Fig. 1.

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who have diseases like tuberculosis, leprosy, mental deficiency and various kinds of heart, liver and kidney complaints. He who devises easy methods of preventing pregnancy in such people will be doing a great piece of social and religious service to society.

Granting that some couples are fortunately endowed with leisure, health and economic stability, the responsibilities of parenthood in these days have become so onerous, that to discharge them properly and to their own satisfaction, not to say the needs of the society, they cannot but restrict their families. In the civilised centres of Europe, America, and several other parts of the world, organisations have been formed to advise mothers how to avoid frequent pregnancies and their consequent troubles. It is high time that many more such organisations are set up, and regular propaganda work is done to acquaint the people with up-to-date measures. In the interest of humanity as a whole, to improve the general grit of society, it is the duty of every state to prevent the birth of the insane, idiotic, leprotic, tuberculous and syphilitic children, and hence all governments should help to form organisations consisting of doctors and scientists, to conduct research and propaganda work, which will enable people to produce a healthy generation.

They do it in the case of cattle, horses and dogs. How much more important, therefore, it is in the case of their human citizens who will be the future electors, legislators and administrators of the several nations of the world?

Regarding the effects of birth control methods, a passage may be quoted from the Lancet of Feb. 4th 1933. "The question upon the effects of the use of birth control in health and conjugal well-being, was largely studied on 339 women in England, by an investigation committee. Of these 107 spoke of them as essential to health and marital happiness, 193 found them satisfactory,and the rest gave up as unsatifactory".

Hundreds of books have come out on contraception. R. L. Dickinson and Margaret Sanger in America, and Marie Stopes, C. P. Blacker, How Martyn, and Michael Fielding in England, have done through their monumental books, written with all the inspiration and fervour of the evangelists of the new creed for the welfare of mankind, after innumerable research enquiries and experimental work, remarkable pioneering work in the cause of birth control. One of the latest books on the subject is "Control of Conception" by Dickinson and Bryant, which contains a compilation of the reports of the national committee of Maternal Health in United States, after an eight years' investigation on the subject.

In London, the Birth Control International Information Centre corresponds with many parts of the world, and publishes occasional bulletines on contraception. The National Birth Control Association in London represents a union of all the various bodies in Great Britain working for the "Provision of birth control advice under medical supervision as an essential part of the public health work throughout the United Kingdom." It also publishes occasional reports on the subject. There are fifty-four birth control centres in United States, where lectures are given to the public. There are several such organisations in Holland, Germany, Russia and other countries in Europe, all of which are engaged in active propaganda regarding the control of conception. In Japan, the Health Department of the City of Tokio has decided to set up clinics in the Municipal Health advice stations, and the people of Japan have no religious conflict on the subject. There is staff and equipments to teach doctors and nurses in contraceptive techniche, in the two big hospitals in Shanghai. In South Africa three clinics have been established in the year 1933, one in Johannesburg, one at Observatory, and another at Pretoria. But India has not yet awakened to the great needs of her people.

It is known that in a few of the big hospitals in Mysore, advices on contraceptive methods are given to people free of charge. It was in the early part of the year 1933, that in one of the most advanced protected states of India, a member of the Legislative Council sent a cut-motion demanding that there should be separate departments in each of the big hospitals of the state to educate the public on contraceptive methods. Thus even some people in India have largely come to understand the grave situation by which an extreme necessity of imbibing such matters to the public has arisen. This is somewhat encouraging.

But our civic fathers and legislators lack the courage of their convictions, or the courage to do for the country what they see other people in other countries are doing for theirs. If we remember and note the opposition that the Sarada bill evoked during its course in the legislature, and is still meeting in its working as an act, it is not a matter for surprise, though it certainly is for regret, that birth control receives at present only indignant condemnation.

Not long ago Sir John Megaw, Director-general of Indian Medical Services, drew an appalling picture of the conditions in India, from materials based on an actual survey of the conditions in a few villages. The conclusions that were arrived at were:— that India has a poorly nourished population, that the average span of life is less than what it might be, that periods of famine and scarcity of food have been occurring in one village out of every five during the ten year period in which there has been no exceptional failure of rains, that in spite of excessively high death-rate the population is increasing much more rapidly than the output of food and other commodities, that young girls who ought to be still at school are forced to become wives and mothers and many of them are doomed to die of child-birth, that epidemics of cholera, plague and smallpox are common and malaria is constantly present throughout the greater part of India. He also spoke about the gloomy outlook for the future, "To a degree not only for the masses of the people who must face intensified struggle for bare existence, but also for the upper classes whose income depends on the production of surplus of crops and other commodities." And the reason for all this? "It is clear", he said "that growth of population has already begun to outstrip increase in production of the necessities of life so that even the existing low standards of economic life must inevitably become still lower, unless some radical change is brought about." What other radical change can possibly strike any one except a reduction in population, and how else can this be brought about, save by intelligent birth control? The condition in the towns is no better, as has been described by Dr. Muthu of Madras who is waging a war against the scourge of tuberculosis.

I have seen a few booklets published in India, but most of them seem to have been printed on lucrative basis, as descriptive catalogues of contraceptive contrivances stocked and sold. Most of the methods roughly described therein, are neither scientifically verified nor up-to-date. At the same time, I do not hold that this book is perfect. It might have and has several drawbacks. But my earnest attempts at as careful a study of the subject as possible, during the last seven years would not have been in vain, if a few of the neediest of my fellow-beings derive profit by reading it and adopting some of the directions given in this book.

CHAPTER II.

Anatomy of the Sex Organs.

A brief study of the anatomy and physiology of the human sex organs is essential to a non-medical person, to understand the techniche of the different contraceptives in vogue.

THE MALE SEX ORGANS.

The male sex organs consist of two groups, the external and the internal. The external group consists of the penis and the scrotum containing the two testicles. The internal group consists of two ductus deferens, two seminal vesicles and two ejaculatory ducts, one set on either side.

Penis. Penis is a pendulous organ, suspended from the front of the waist and containing the urinary passage which is called urethra. In the flaccid ordinary state, it is cylindrical in shape, and hangs vertically downwards, midway between the upper part of the two thighs, but placed in a more anterior plane. When erect, it occupies a horizontal position, and assumes the shape of a triangular prism with rounded edges; one side of the prism forming the upper or anterior surface.

It is composed of three cylindrical masses of spongy matter, bound together by fibrous tissue and covered by skin. Two of the spongy masses which are placed side by side, are of equal size, and are termed corpus cavernosum. The third, corpus spongiosum is a little smaller, and is placed behind the other two. It contains the urinary passage within it. Traced from behind, the corpus cavernosum originates from the pubic bone and coming forward, ends abruptly in a rounded extremity at some distance behind the point of the penis. The corpus spongiosum is a little expanded behind, at its origin, which contains the dilated portion of the urinary passage, and is called the urethral bulb. The anterior portion of the corpus spongiosum is expanded in the form of an obtuse cone, flattened from above downwards. This expansion is termed *glans penis.* It is moulded on the rounded ends of the corpus cavernosum, extending further on their upper than on their lower surfaces. At the summit of the glans, is the slit-like, vertical, external urinary orifice. The circumference of the base of the glans forms a projecting rounded border *(corona glandis)*, behind which is the neck of the penis. The loose fold of skin that covers the glans in the flaccid state is called the prepuce, or the fore-skin. It varies in length in different people, and in a few

Fig. 2.

Longitudinal section of the male sex organs.

B.	Bladder which holds the urine.
D.	Ductus Deferens.
S.	Seminal vesicle.
P.	Prostate.
C.	Corpus cavernosum.
Sp.	Corpus spongiosum.
U.	Urethra.
T.	Lobules.
Sc.	Scrotum.
G.	Testis.

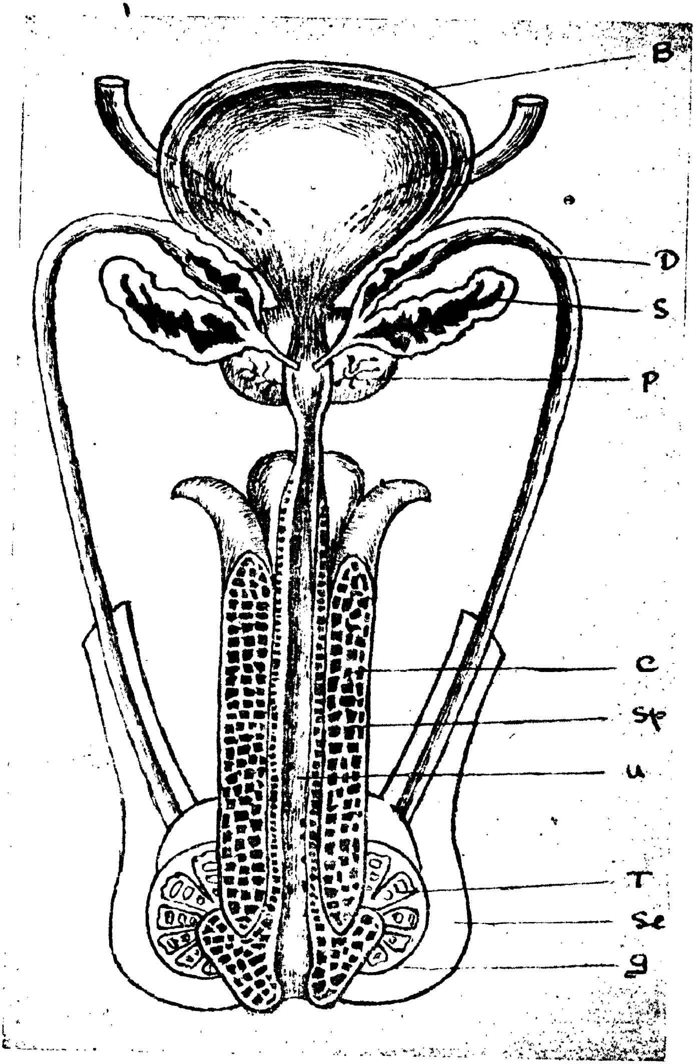

Fig. 2.

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it is completely absent. It is mobile over the glans penis.

The size of the penis varies in different individuals, usually from three to six inches in length in an adult. It is generally long among the Negroes of Africa and America, the average length being six inches when flaccid, and nine inches when erect. The Arabs have a long and thin penis, but the difference during erection is not very marked in them. The Jews as a class possess a long penis. The Sikhs and the Pathans in India are wellknown for their long penis. The average European and the average Indian have a fairly medium-sized penis, while the Chinese and the Japanese have comparatively small ones. It is said that, in the flaccid condition the penis of a person will be as long as the width of his four fingers and when erect about six finger-breadths.

There are several malformations found under exceptional conditions. But to describe them is beyond the scope of this book.

Two arteries supply the penis with blood, but only one vein empties the blood from it. This anatomical feature is of great importance with regard to the sexual functions of the organ.

Scrotum is a hairy bag of corrugated skin and subcutaneous tissue, containing the testes and parts of the ductus deferens. It is situated behind the attachment of the penis to the body. It is divided in its surface into two lateral portions by a ridge, which is continued forward to the under-surface of the penis and backwards along the mid-line of the perineum to the anus. Of those two lateral portions, the left hangs lower than the right. Under the influence of warmth and in the old and the debilitated, the scrotum becomes elongated and flaccid, but under the influence of cold and in the young and the robust, it is short, corrugated and closely attached to the testes.

Testes, two in number, are suspended in the scrotum, by means of two separate spermatic cords, coming down to the scrotum from the respective sides of the lower part of the abdomen. Each testis is two inches by one inch in dimensions, oval in shape, compressed laterally and lies in an oblique position in the scrotum. It consists of several glands containing innumerable lobules. Convoluted tubules pass out of the lobules and join together to form one big tube which enters the spermatic cord. This forms the ductus deferens.

Spermatic cords hold the respective testis of each side in the scrotum. They contain the arteries, veins and nerves of each side of the scrotum and the testis, and hold between these structures, the ductus deferens from the testis. The cord goes vertically upwards from the scrotum and ends in the lower part of the abdomen. The ductus deferens curves round medially and downwards inside the pelvic cavity, to open into the lower extremity of the vesicula seminalis, to form the ejaculatory duct. The abdominal portion of it, is enlarged and tortuous. (See fig. 2.)

Vesicula Seminalis are two lobulated pouches, situated inside the lower part of the abdomen, between the urinary bladder (the reservoir of urine) and the rectum (the lower region of the intestinal canal). It serves as the reservoir of semen. Each sac is somewhat pyramidal in shape, the broad end being directed backwards, upwards and lateralwards. It is three inches long, but often varies in size. The upper ends of the two vesicles diverge from each other. The posterior surface rests upon the rectum. The lower extremities point and converge towards the base of the prostate, where each joins with the corresponding ductus deferens to form the ejaculatory duct.

(**Prostate** is a gland situated between the two Seminal vesicles, below the bladder, at the commencement of the urinary passage. The passage itself pierces this gland and passes through it in the first one inch length of it. It is perforated not only by the urethra but also by the whole lengths of the ejaculatory ducts.)

The ejaculatory ducts are two in number, one on either side of the middle line. Each is formed by the union of the ductus deferens and the duct from the vesicula seminalis. They commence at the base of the prostate and run forwards and downwards between its lobes and end by separate slit-like orifices, in the upper part of the urethra.

FEMALE SEX ORGANS.

They consist of an external and an internal group. The external group consists of the vulva, which contains the mons, the labia majora, the labia minora, the clitoris and the vestibule. The internal group consists of the vagina, uterus, two fallopian tubes, and two ovaries.

Mons is the rounded eminence in front of the pubis, below the lowest part of the anterior abdominal wall. It is nothing but a pad of fat. It is covered with hair at the time of puberty. The area covered by hair varies in different people. Among the people of cooler clime the growth of hair is much less than among those of the tropics. There are individual variations as well. In some it is scarce while in a few it is even entirely absent.

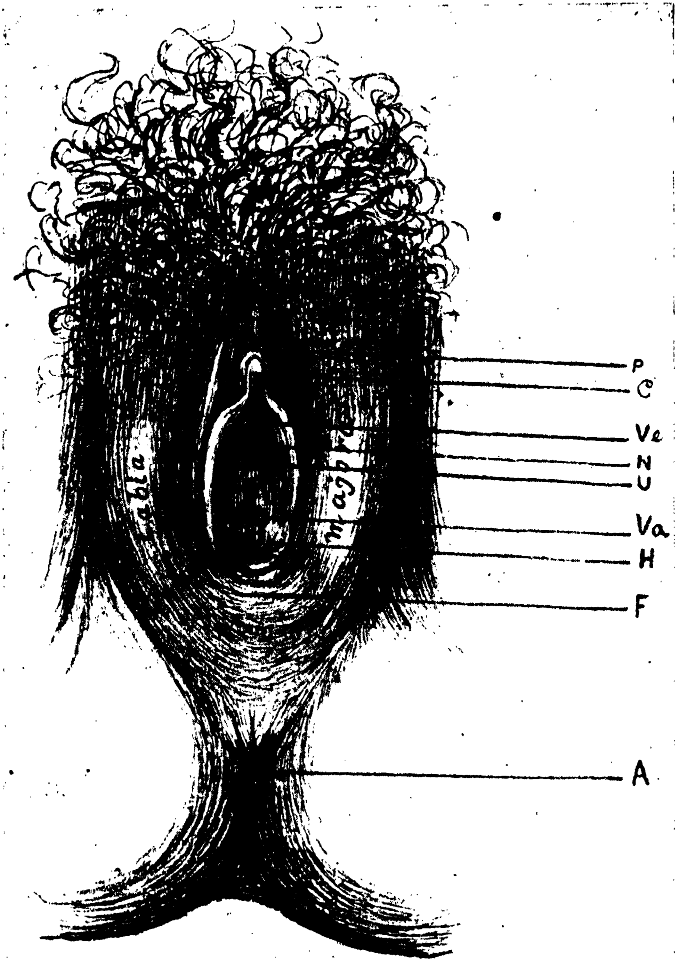

Fig. 3.

(To face page 37.)

Fig. 3.

Female external sex organs.

P.	Prepuce of the clitoris.
C.	Clitoris.
Ve.	Vestibule.
N.	Labia minora.
U.	Urethra.
Va.	Vagina.
H.	Hymen.
F.	Fornix.
A.	Anus.

Labia majora are two prominent longitudinal folds of skin, which extends downwards and backwards from the mons and form the lateral boundaries of a cleft into which the female urinary and the vaginal passages open. Each labium has two surfaces, an outer pigmented one partly covered by hair, and an inner smooth surface which is always moist, containing a number of secretory glands. The labia are thicker in front than behind, where they meet to form a depression between them.

Labia minora are two triangular folds of smooth, soft, moist skin, situated between the major folds, and extending from the clitoris, obliquely backwards, downwards, and lateralwards. They end on either side of the orifice of the vagina, between the labia majora. In the virgin, the posterior ends of the labia minora are joined across the middle line by a fold of skin. Anteriorly, each labium divides into an upper and a lower portion. These portions pass above and below the clitoris and meeting their respective counterparts to form a sort of prepuce for the clitoris. The opposed surfaces of the labia minora are moistened by the secretion of sebaceous and sweat glands on them. They have no hair on them, but, are very sensitive, having an abundance of nerve-endings. When exposed to air for long, they become leathery and hard.

Clitoris is the *homologue of the penis in* the male. It consists of two corpora cavernosa just as in the penis, and is extremely sensitive and erectile. Posteriorly it is attached to the pubis. It is covered by the anterior margins of the labia minora which form a prepuce for it. (see fig. 3.)

Vestibule is the smooth almond-shaped area bounded by the labia minora on the two sides. At its apex is the clitoris, and in the centre it is perforated by the urinary passage in front and the vaginal orifice behind. The urethral opening is over one inch behind the clitoris and assumes the form of a short sagital cleft, with slightly raised margins. The vaginal orifice is a median slit lying just behind the urinary orifice. Posteriorly and at the sides the vaginal orifice is bounded by a soft membrane called hymen, which in the virgin almost completely blocks the orifice, leaving a narrow aperture in the centre. (see fig. 3). The size of the vaginal orifice varies inversely with that of the hymen.

Vagina is the canal which unites the uterus and the vulva. It is situated behind the urinary bladder, and in front of the rectum. It is directed upwards and backwards, and it opens forwards. It joins the uterus at a right angle.

Usually the vagina is about four inches to six inches long. But, it is said that in the Arabs, Hebrews, Persians and Negroes, it is very deep, say, even ten inches.

Its anterior and posterior walls are ordinarily in contact, and it is always like a collapsed bag. It is wider above than below and is capable of great distention. Its anterior wall is about two to four inches and the posterior about four to six inches. It is constricted at its commencement, dilated in the middle, and slightly narrowed at its uterine extremity. It surrounds the vaginal portion of the cervix, a short distance from the external orifice of the uterus, its attachment extending higher up on the posterior than on the anterior wall. To the recess behind the cervix the term posterior fornix is applied, while the smaller recesses in front and the sides are called the anterior and lateral fornices. The membrane lining the vagina is soft and thrown into several folds. (see fig. 4). These folds can be well seen in the virgin, while in the parous it is stretched and becomes more and more tense. Beneath this membrane there is a muscular layer with erectile tissue. The lower vagina is surrounded and held by a strong muscular girdle, but the upper half is collapsed. At the anterior end of the vagina which forms the vaginal orifice, there is a muscular sphincter which can narrow or widen the opening at will. The vaginal walls are well supplied by blood vessels and nerves. There are some glands at the anterior end of it which secrete a thin faintly acidic fluid known as the pre-coital fluid. These glands function only during voluptuous sensations.

Uterus is a hollow thick muscular organ placed between the bladder in front and the rectum behind. It is pear-shaped and slightly flattened antero-posteriorly. It lies with its long axis directed backwards and downwards, and its lower end meets the vagina at right angles. When the woman is standing, the uterus lies almost horizontally. But its exact position varies with the fullness of the bladder and various other conditions.

In the virgin the uterus is three inches long, two inches wide and one inch thick. It consists of two parts, an upper body, and the lower cervix between which there is a small constriction. The body is somewhat similar to an isosceles triangle with the apex downwards. Each of the upper corners opens into the corresponding fallopian tube and the lower one is continuous with that of the cervix. The cavity of the uterus is a potential space, the anterior and posterior walls being normally in contact. It is one inch wide and one and a half inch long.

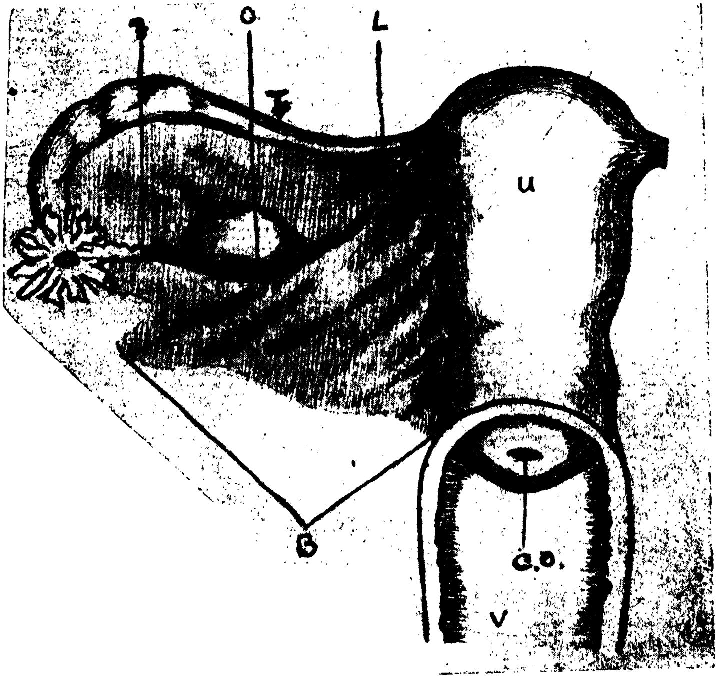

Fig. 4.

Internal female sex organs.

V.	Vagina.
C.o.	Cervical opening.
U.	Uterus.
T.	Tube.
F.	Fimbriae.
O.	Ovary.
L.	Ligament which holds the ovary in position.
B.	Broad ligament.

(To face page 40)

The lower part of the uterus below the constricted region is the cervical portion. It is somewhat conical in shape with its truncated apex directed downwards and backwards. It is one inch long and slightly wider in the middle than at either ends. It projects into the vagina to about one-third of an inch, through the anterior vaginal walls between the anterior and posterior fornices. If a finger is inserted deep into the vagina, the cervix can be felt as a fairly hard knob with a depression in the centre. This depression is the aperture through which the cavity of the cervix communicates with the vagina. The external orifice is bounded by two lips, an anterior and a posterior, of which the anterior is the shorter and thicker, although on account of the slope of the cervix it projects lower than the posterior. Normally both the lips are in contact with the posterior vaginal wall. The canal of the cervix is some what fusiform in shape and flattened from before backwards. It communicates above through the internal orifice with the cavity of the uterus and below with the vagina through the external orifice. The mucous membrane of the uterus is continuous with that of the fallopian tubes internally and that of the vagina externally. The uterine wall is half an inch thick and consists of the strongest muscles in the human body. The form, size and situation vary in different races and individuals at different periods of life and circumstances. The Jews for example are said to possess a very big uterus and proportionately possess a larger cervix.

In the foetal stage, the uterus projects above the pelvic cavity inside the abdomen and the cervix is much larger than the body. At puberty the uterus descends into the pelvis. During menstruation it is enlarged congested and its external orifice is rounded and swollen. During pregnancy it assumes an enormously big size, but after confinement regains nearly its usual size. In old age it becomes atrophied, paler in colour and denser in texture. The vaginal portion of the cervix is longest in those who have just undergone defloration, shortest in multiparae, widest in prostitutes, narrowest in nulliparae, and thickest in young widows and women who cannot enjoy sexual life.

FALLOPIAN TUBES.

They are two in number. Passing laterally from the two upper angles of the uterus to the sides of the pelvis in the lower abdomen, they open into the abodominal cavity. They are muscular in structure and the canal of each tube forms a direct communication with the peritoneal cavity and the uterus.

Each tube is about four inches long and

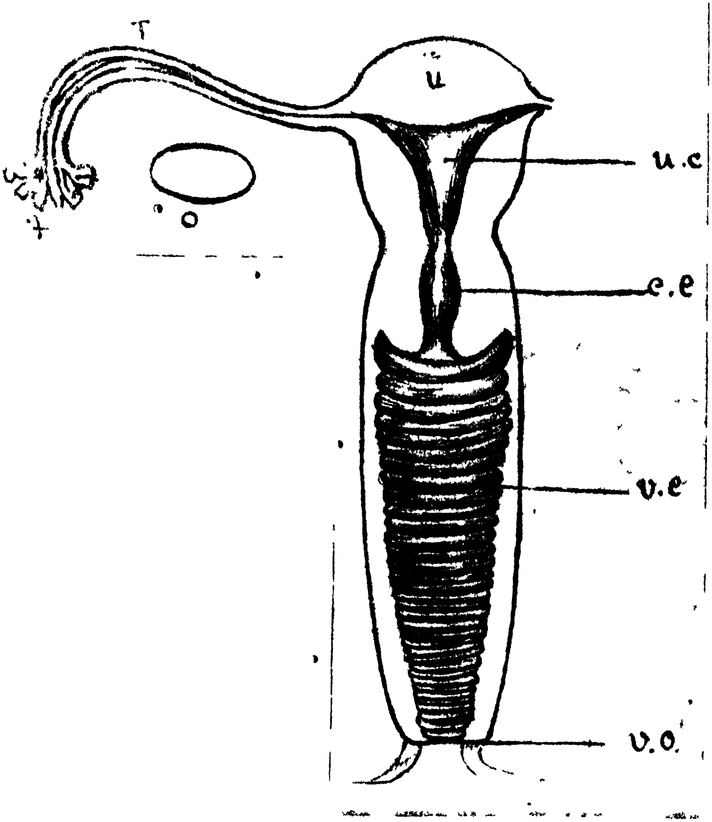

Fig. 5.

Longitudinal section of the female internal sex organs.

V.o. Vaginal orifice. V.c. Vaginal canal.
C.c. Cervical canal. U.c. Uterine cavity.
U. Uterus. T. Tube. F. Fimbriae. O. Ovary.

(To face page 42)

runs outwards, then turns backwards and arches slightly over the ovary, so that the abdominal opening is directed backwards. The uterine opening is very narrow, but that into the peritoneal cavity is a little larger and it is surrounded by a fringe of small terminal processes called fimbriae. (see fig. V) The middle part of the tube is a bit dilated. The membranes lining the tube contains a layer of ciliated cells. These ciliae work in a direction from the abdominal opening towards the uterus.

Ovaries are two flattened almond-shaped organs corresponding to the testicles in man. They are situated one on either side of the uterus below that fallopian tubes and suspended in the ligaments that hold the tubes and the uterus in position (see fig. 5). Each ovary is about one and a half inch long and three-fourth inch wide. The right is often larger than the left. The size of the ovary may vary in different persons and on different occasions. At its lateral extremity a part of the fimbriae is attached. Its exact position also varies according to several circumstances. In many, the ovaries become displaced during the first pregnancy and probably never return to their original position. In the foetus the ovaries are situated, like the testes, in the lumbar region, but later they gradually descend into the pelvis.

CHAPTER III.

Physiology of the Sex Organs.,

Having obtained a fair idea of the size, shape, position and structure of the different parts of the sexual organs, it is essential to know something of the functions and mode of action of the various parts described in the former chapter, to understand the rationale of the devices by which impregnation can be prevented.

THE MALE SEX ORGANS.

Testicles. The testis and the ovary are the most important organs which distinguish the male and the female. All the other differences might be deceptive. The testis and the ovary are developed at about the same region in the abdomen, but later they descend down, and the testicles come into the scrotum just before the males are born. Children with undescended testicles, i. e. with only one or no testis in the scrotum are not very rare.

I have had the opportunity to see seven cases

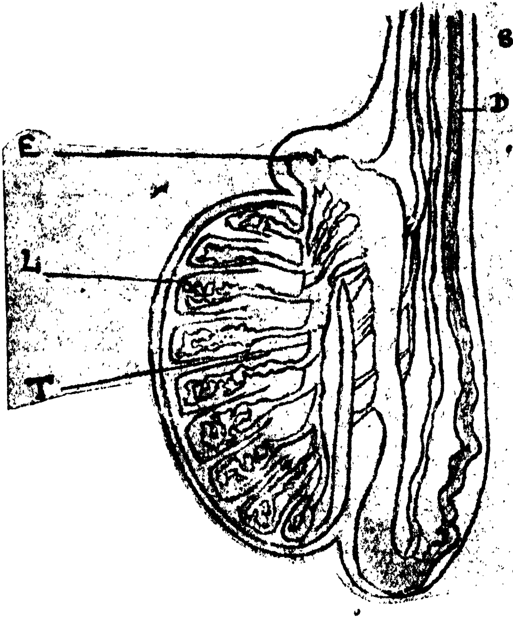

Fig. 6.

Fig. 7.

Fig. 6. Longitudinal section of the testis.

E. Epididymus. L. Lobule.

T. Tubule. D. Ductus Deferens.

Fig. 7. Spermatozoon.

H. Head. B. Body. T. Tail.

(To face page 45)

of undescended and partially descended testicles, one with both testes complelely undescended, two with one testicle completely undescended and four with one testicle partially descended. The partially descended ones were lodged in the inguinal canal midway between the root of the penis and the fold of the thigh. These four cases were operated upon, and in two the undescended testicles had to be removed. In the other two the testicles were pulled down and fixed in the scrotum. When retained in the abdomen they give rise to no symptoms. People with both testes undescended are considered to be functionless as regards procreation. They may be sterile but not impotent. Occasionally the testis while descending slips down between the scrotum and the thigh and gets lodged in the perineum.

The malposition in the inguinal region makes it more exposed to external injury. It is subjected to pressure and may become inflamed and painful, and there is the risk of strangulation or torsion, with the consequent danger of even losing life. The external position of the testicles in the scrotum makes them more accessible to the opposite sex and available to voluntary stimulation.

The testis on section is found to consist of about 200 to 400 lobules, and each lobule contains two or three convoluted tubules, (see fig. 6). Inside these tubules, there are a peculiar form of cells (germinal epithelium), which by division and subdivision develop to form the spermatozoa. There are certain other cells in the tubules which secrete a fluid which is called the semen. In the apices of the lobules the tubules become less convoluted, and unite together to form about thirty larger ducts. They all join together and form the epididymus. The seminal fluid with the spermatozoa pass from the tubules to the epididymus and thence to the ductus deferens.

Spermatozoa is the male germcell. It is present in the semen in enormous numbers. It has a pear-shaped head, a neck, a short cylindrical body, and a vibrating tail (see fig. 7.) A drop of fresh semen from a healthy individual, placed on a slide and covered by a cover-slip, when put under the microscope, will show a number of these living organisms wriggling about fairly active, and will remind us of young tadpoles in a pool of water. Their tails act as propellors. Placed under favourable surroundings, spermatozoa retain their vitality and fertilising power, for several days. In certain animals it has been proved that spermatozoa may be retained in the female passage for several months and are capable of fertilising. A specimen collected at about 10 P. M. in an ordinary bottle contained moving healthy-looking spermatozoa on microscopical examination at 10. A. M. on the following day.

The movement of the spermatozoa may be arrested by certain drugs such as quinine, acids, alkalies, etc. Even water stops their activity; urine also produces the same effect.

Spermatozoa are not found in the semen before the age of puberty. Even after attaining that age, it needs not necesserily be present in all specimens of semen. In people who are old and debilitated, it may be absent. After repeated sexual indulgence, the semen may not contain spermatozoa. Intake of certain substances such as acids, inhibit the production of these germcells. In old people, the age at which spermatozoa disappear from semen varies in different individuals. People, after the age of sixty, are rarely capable of procreation. Among the westerners it is seen that even some people of eighty beget children. But men in the tropics lose this power much earlier than those of the cooler clime. All those who have erection and can successfully do the sexual act need not necessarily possess fertile spermatozoa. I have examined several specimens of semen of apparently healthy men, varying from thirty to fifty years of age, to see whether they were responsible for the nulli-parous condition of their wives. Some of those specimens were mere albuminous fluids, without a single spermatozoa in them. A few others contained a sort of degenerated inactive spermatozoa. In one specimen, I could see four different kinds of living germcells all very sluggish in movement. The man from whom this last specimen was collected was used to sexual excess. I advised him to abstain from intercourse for some days together and have coitus soon after his wife's next menstrual period. The result of my advice was a baby-boy, now one year and six months old.

Besides the production of the semen containing the spermatozoa, the testis has another important function. Most of us would have seen that castration in animals makes them not only sterile, but also produce in them several other changes, such as, fattiness, docility and idiocy. Early castration makes a boy lose all his virile qualities. It prevents the growth of hair on his face and pubic region, and does not deepen his voice. He becomes more and more feminine, sexual desire ceases, erection of the penis does not occur, and he always behaves like an unthinking fool. He loses all his courage and exhibits fondness of children and other pets, just like women.

All glandular structures in the body produce an internal secretion consisting of a chemical substance which is absorbed into the body. The testicles too produce such an internal secretion, besides that of the semen containing the spermatozoa. This internal secretion is responsible for the virile qualities in man. It is supposed to be the cause of all the secondary sexual characteristics. Thus, if a testis is transplanted in a female and her ovaries are removed, she might develop masculine characteristics. Recently, several research experiments have been done on this point and many discoveries were made. The testicular extracts from sheep, ox and pig are prepared and their internal secretions separated and sold. They say that these patent extracts are very effective in producing all the characteristics of manliness and virility in those who lack them. They are all widely advertised as the best remedy for impotence, and people who are really in need of these will pay anything to get themselves rejuvenated. As such, they are largely sold at high prices. But many of them have been found to be not worth the trouble and the money paid. Having tried some of these extracts on a few of my patients, I can say that the results were extremely discouraging. So much difference is there, between the artificial and the natural secretions!

The ductus deferens is cylindrical in form and presents a hard cord-like feel to the examining fingers. Its canal is extremely narrow but the walls are thick and muscular. It carries the seminal fluid that is being formed in the testis, to the seminal vesicle. Division of an inch or two of the ductus deferens on both sides makes a man sterile, at the same time retaining his potency. This operation is called Vasectomy.

Visicula seminalis forms a reservoir for the semen produced in the testes and carried by the ductus deferens. All the semen that is prepared is stored in this sac for future use. This fact is proved by the passing of semen which contains spermatozoa by those on whom vasectomy is done, for about two weeks after the operation. When unused, a large portion of this stored semen is reabsorbed into the system and utilised for the development of the secondary sexual characteristics.

Besides this function of storage and reabsorption of semen, the seminal vesicles have a secreating function as well. The mucous membrane, lining the inside of this reservoir, secretes a fluid which dilutes the semen and acts as a lubricant for this extremely vital substance. This secretion is fairly thick, albuminous, alkaline, and contains a good deal of mucous in it.

Semen is a thin, jelly-like greyish-white fluid, having a stale odour, like that of the pulp of a tender cocoanut. It is thick on emission, liquifies a few minutes later, and afterwards becomes sticky. Each ejaculation brings about a teaspoonful of it. But this quantity varies in different individuals and at different times. If during coitus or otherwise ejaculation occurs, many times a day in the same person, the semen turns to blood; thereby showing severe congestion of the organ concerned, in the preparation and the storage of this vital substance in man.

The position of the seminal vesicles between the bladder and the rectum, exposes them to much pressure, dependant on the condition of those two organs, and this is responsible for the origin of so much mental worry and anxiety in many young men, which not uncommonly lead to a sort of mental derangement in them. Whenever the bladder is full, or the rectum loaded, there is a chance of their pressing the seminal vesicles and squeezing the semen out. This is usually the cause of emission or night-pollution. Emission is an involuntary passing out of the stored semen in a subconscious condition of the mind. Often it occurs only in those whose minds are in some way exercised by causing temporary excitement, generally by their seeing, hearing, or reading, obscene, prurient literature. This sexual excitement causes larger production of semen in them and as the seminal vesicles become overfull, the excess is discharged during sleep.

Excessive sexual excitement makes the seminal vesicles chronically inflammed, and they produce a glairy fluid, which also often pass out during micturition or defecation. This too is mistaken for semen, and many young men often get worried over it. This discharge can be easily distinguished from the semen by getting it microscopically examined. It is not seldom that one meets with young folks coming up with such silly complaints, thinking themselves to have been infected with one of the most serious and irrecoverable diseases. To those I would say only one sentence: "Go home and attend to your work".

Ejaculatory ducts pass the seminal fluid from their respective seminal vesicles and ductus deferens to the urethra. They diminish in size and converge towards their terminations.

The Prostate about which some mention has already been made, is also of some importance. It secretes a thin, albuminous fluid, which is slightly acidic in reaction, and helps to keep the spermatozoa in motion. It is said that it causes a temporary coagulation of the semen, thus preventing it from easily flowing out of the vagina. Some doctors have suggested that massaging the prostate through the anus cures the desire for masturbation.

Urethra is the urinary passage. In the male it is about seven to eight inches long, and extends from the bladder to the end of the penis. At its first part the ejaculatory and prostatic ducts open into it. Several glands invest the mucous membrane of the urethra. This membrane lining the urethra, consists of a peculiar kind of erectile tissue, which acts during sexual excitement and the aforesaid glands discharge a fluid. This fluid acts as a lubricant to the urethra for the easy discharge of the semen. It is secreted during the first stage of the sexual excitement and is called the male precoital fluid.

Penis. It will be no new idea to any reader, that the two functions of the penis are urination and the proper placing of the seminal fluid. A third function may be added, namely that it is an organ capable of imparting the maximum sexual pleasure to the female sex. Let us see how it effects all these functions.

The penis assumes a passive state during micturition, but during sexual union it plays an active part. Every organ receives into it plenty of blood when it is in an active state. The arteries carry blood into the organ and the veins drain the same from it. All the arteries are placed deeper in the tissues of the body, but the veins are situated near the surface. This arrangement of the blood vessels has much to do with the sexual function of the penis. Penis is supplied by the dorsal and the deep arteries. These end in a capillary network, the branches of which directly open into the spongy spaces of the corpus cavernosa. Some assume a tendril-like form, and become convoluted, dilated, and they open into the cavernous spaces. This blood is returned by a series of veins, which emerge from the base of the glans penis and converge to one vein on the dorsum* of the penis. Many others also join in the same way, but a few pass out of the root of the penis and join the venus plexus of the prostate. When sexual excitement occurs, plenty of blood passes into the penis through the arteries and fills the spongy tissue and thereby the penis gets enlarged.

This enlargement of the penis, causes, some pressure which produces a reaction of the surrounding perineal muscles at the root of the penis and makes them contract. This pressure does not affect the arteries bringing in the blood, on account of their deep position and muscular non-collapsible structure; but it mostly, if not entirely, cuts off the drainage through the veins as they are situated near the surface and have collapsible walls. Hence, during excitement the penis becomes severely congested, swollen, and thereby, firm and rod-like. This condition of it is called the erection of the penis, which enables it to penetrate the narrow vaginal orifice easily. Besides the stiff and swollen condition of the penis when erected, it produces a throbbing movement on account of an involuntary contraction and relaxation of the perineal muscles. This alternate action during the erection of the penis, makes it move up and down in the vertical plane, to about an angle of thirty degrees each time. This movement of the penis during erection can be produced voluntarily also, by the contraction of the perineal muscles. An absence of this power of voluntarily producing the up-and-down movement of the erected penis by the contraction of the perineal muscles, is a sure sign of impotency in the male. An erection does not last long under normal conditions. But there is a pathological stage usually occurring in those affected by certain diseases such as gonhorrea, gout etc., or under the action of certain drugs such as damina, cantharidin, cannabis-indica etc., which is called priapism, during which time the penis remains erected for a number of hours, followed by a severe crisis and fall with a reaction of temporary incapacity for erection which lasts long. Hence, all artificial methods of producing erection and prolonging it are to be deprecated.

There are certain harmless ways of prolonging the erected condition of the penis, which may be cited here. Though it is a digression so far as the purpose of this book is concerned, as it will be of great use to those who are worried at the easy production of orgasm and fall of the penis, which does not enable them to enjoy properly, I shall devote, a few lines on it. The worry is greater with regard to the woman who seldom get a chance to enjoy the culmination of the orgasm, on account of the premature fall of her partner's orgasm. Several couples are worried over it, and it may be affirmed without any exaggeration that ungratified sexual enjoyment is one of the chief causes of hysteria and several other ailments in women.

There are three ways by which the orgasm can be prolonged in the male:—

(1) **Mental.** The mind should be trained to control itself. During intercourse the male should be the passive member and let the other take the active part. As soon as erection occurs and sexual union begins, try to keep the mind engaged on some problem which will interest and keep it thinking long. Many people had considerable success by adopting this method. I know of a money-lender who usually calculates, during intercourse, the interest he is to gain during certain period, out of the money he has invested on loans. Another, a criminal vakil, sets his mind on the track of some clue to defeat his opponent in the argument to be conducted the next day. Thus anybody can make his own important business the subject matter to fix his thought upon during the sexual act. Then the erected penis will remain so for a considerable time. In the meanwhile, his partner can be the active member. If he has nothing to divert his attention, he can solve some small arithmetical problem, i. e. how many pence for £ 500? etc.

(2) **Physical.** The perineal muscles can be trained to contract voluntarily. The act,* by which the last part of the faecal matter is passed during defecation, is the very act which contracts the perineal muscles. This act must be done off and on, so that those muscles may get used

to such an action. By this act of contracting the perineal muscles during sexual union, the orgasm can be kept up for a minute or two more. Unless it is constantly tried during leisure hours, it wil· take some time for one to make this action effective in prolonging the erect condition of the penis.

(3) **Therapeutic.** I would strongly deprecate the use of any medicine for this purpose.

So much for a useful digression. Erection is entirely governed by external stimuli and reflexes from the brain. •Its absence at some time or other does not show that the person is impotent. Several causes might lead to such a condition. Nervousness and fear often influence in preventing erection, in spite of the best of stimuli.

Some people can never enjoy the coitus with any other woman except their wives, as they never get the erection with the former. They flirt well enough, but when approached for sexual union they fail. Erection is a phenomenon which might occur at the most inopportune moment, but may not occur at all when one gets the best opportunity.

Glans penis. The peculiar shape of the glans penis described in the previous chapter is of importance in the act of sexual union. The base of the glans has a greater circumference than any other part of the penis. The glans acts like the valve in a suction-pump. It easily slips in but when pulled back the corona glandis rubs against the sides of the vagina with greater friction and imparts to the vaginal mucous membrane an ecstacy which man cannot know. This valve-like action also prevents the easy slipping out of the penis from the grip of the vagina.

FEMALE SEX ORGANS.

Ovary in the female corresponds to the testis in the male and it is the most important and the chief distinguishing characteristic of the female.

It consists of a number of vesicular oviaran follicles imbedded in the meshes of a stroma of net-work. This stroma is a soft tissue abundantly supplied with blood vessels and nerves. It contains cells resembling those of the testis. On making a section of it, several vesicles of various sizes can be noted. (see fig. 8). These develop the female germcells or the ova. Each follicle contains an ovum and a transparent albuminous fluid. The development and maturation of the follicles and ova continue uninterruptedly from puberty to the end of the fruitful period of a woman's life, while their formation commences even before birth. Before puberty the ovary is small and the follicles contained therein are placed near the surface of the ovary. During that period they present the appearance of a large number of minutely closed vesicles, constituting the early condition of the follicles. Many never attain maturity, but shrink and disappear. At puberty the ovary is enlarged, becomes more vascular, follicles are developed in greater abundance and the ova mature and become capable of fecundation. After attaining a certain development, the follicles gradually approach the surface of the ovary one by one and burst. The ovum and the fluid contents are liberated into the abdominal cavity. The fimbriae of the fallopian tube set up a current which drives the ova into the corresponding tube. In the meantime the rent produced in the ovary heals up and the space in the follicle is filled up by what is called corpus luteum.

Usually, only one ovary discharges the ovum at a time. The production and discharge of the next ovum occurs in the other ovary, after twenty-eight days. Thus each ovary discharges one ovum once in fifty-six days, by the bursting of

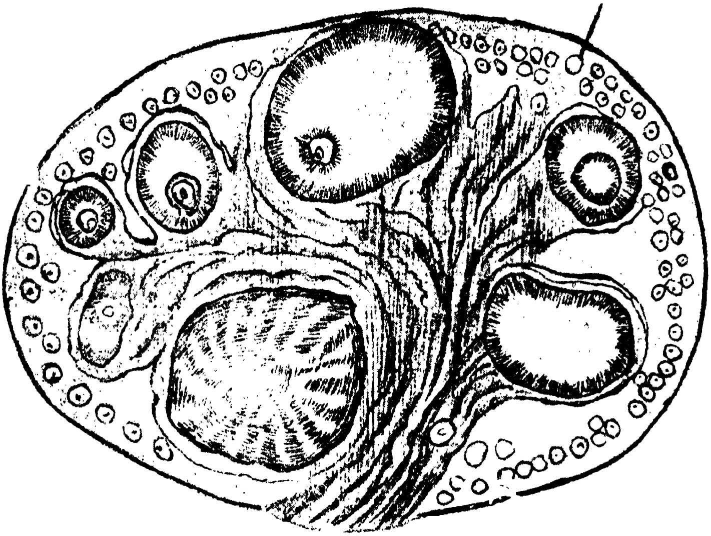

Fig. 8.

Section of the ovary.

Note the several stages of the graffian follicles.

V. F. Vesicular follicles in their earliest stage.

(To face page 60)

one of their graffian follicles. The corpus luteum consists of special kinds of cells which perform some important functions.

1. These cells help to heal the rent in the ovary produced by the break of the follicle with minimum scar tissue.

2. They have an internal secretion which controls the nutrition of the uterus. Each organ, each tissue and each cell are supposed to have their own secretory products which through the blood-stream, produce a certain influence on the other parts of the body. This internal secretion is called the Hormone of the particular organ.

3. When pregnancy occurs, the internal secretion of the corpus luteum aids the attachment of the ovum to the uterus, and maintains its raised nutrition.

4. If pregnancy does not occur, this internal secretion is supposed to cause the preparation of the uterus to receive the next ovum through menstruation. It regulates the premenstrual changes, arrests ovulation in the early months of pregnancy, and provides for the development of the fertilised embedded ovum.

5. It is supposed that this internal secretion is the causative agent for many of the sexual characteristics in the female.

Ova. Each follicle usually contains a single ovum but occasionally there may be two or more. The ovum is enclosed in a thick transparent envelope and contains the cell-substance or the yolk with a nucleus in it. The yolk is for nourishing the embryo in the early stages of its development. The nucleus is a large spherical body which at first occupies a central position but becomes eccentric as the growth of the ovum proceeds. The nucleus contains in it a nucleolus or germinal spot.

Tube. The function of the fallopian tube is to catch the fully developed ovum and forward it to the uterus. It is believed that the lateral end of the tube dilates at the ejection of the ovum into the abdominal cavity, and the fimbriae wave as it were the ova into the mouth of the tube. Ciliae in the mucous membrane of the tube slowly drive the ovum in the direction of the uterus and thus facilitates the meeting of its mate. The mucous membrane secretes a fluid, which, with the help of the contraction of the muscular walls of the tube helps the propulsion of the ova.

Uterus has a very thick muscular wall and possess the strongest muscles in the body. The mucous membrane, lining the inside of the uterus is smooth, soft, pale, red and consists of an embryonic nucleated kind of cells. It contains a number of tubular glands lined by ciliae. These glands secrete a milky, faintly alkaline fluid, which keeps the mucous membrane moist. They are of small size ordinarily, but get enlarged after impregnation. In the cervical portion, the mucous membrane is thrown into several oblique ridges. In this membrane are numerous glands which secrete a thick, sticky, tenacious, faintly alkaline, characteristic mucus. In the upper two-thirds of the cervix the mucous membrane is ciliated. The vaginal surface of the cervix contains a membrane similiar to that of the vagina.

One need not be told that, the main and the only function of the uterus is to be the cradle of the baby before its birth. The fertilised ovum is held in the uterus, fed, nourished, and brought up to full growth, for about nine months after impregnation. Then it is sent out to the world as a new human being to continue the human race. The details of this development can be studied later.

Menstruation. After the age of puberty, that is after the ova has began to become mature and come out of the ovary, the mucous membrame of the uterns, gets hypertrophied, or prepared to receive the ovum. Once prepared, it remains ready for reception of the ovum till a fresh one is discharged, which occurs only after another 28 days. When a new ovum is liberated, the uterus again prepares to receive it by casting off the already hypertrophied cells and producing a new membrane, which in turn gets hypertrophied later. This casting off of the old cells and preparing a new layer is what is called menstruation (Menses, Catamina). Each follicle, as it develops, produces by means of its internal secretion, characteristic changes in the mucous membrane of the uterus. About the middle of the menstrual cycle the follicle bursts and ejects the ovum. The corpus luteum cells are formed, which function up to the 28th day. They induce by means of their internal secretion, the glands in the mucous membrane of the uterus, to secrete a fluid, which contributes later to the menstrual fluid. The ovum, if unfertilised, is supposed to die by the 28th day, and with the death of the ovum, the corpus luteum degenerates and menstruation supervenes. Usually this phenomenon occurs once in 28 days. The prominent noticeable feature of this process is a discharge of blood and mucous from the uterus through the vagina. In all women, after the age of puberty, this occurs at regular intervals of about a month and lasts each time for about three to five days, except when pregnancy intervenes.

Menses begins when the ovary begins to extrude ova by the bursting of graffian follicles. Usually it is between the twelfth and the sixteenth year of a woman's life. Town-girls seem to start menses earlier than their sisters in countryside, as the former become sexually precotious earlier. Women of the tropics also attain puberty earlier than those of the temperate regions.

The menstrual cycle consists of four stages.

(1) **Premenstrual congestion** begins four or five days before menstruation. It is characterized by an increase in thickness and congestion of the mucous membrane. The glands become distended and lengthened. The whole mucous membrane becomes swollen.

(2) **Bleeding stage** lasts four or five days; parts of the mucous membrane are denuded and the small blood vessels give way. Blood oozes into the uterine cavity. The muscles of the uterus slowly contract and relax on account of the irritation set up by the oozing blood. This intermittent contractions expel the blood and the denuded mucous membrane into the vagina. Thus the menstrual fluid consists of blood, secretions of the uterine glands, parts of dead mucous membrane and some mucus from the cervix. It is usually dark red in colour, alkaline in reaction, and has

a very characteristic smell, something like that of the marigold flowers. It does not clot because perhaps it is mixed with mucus.

(3) **Involution stage** lasts about seven days after the real menstruation. By this time the mucous membrane is shrunk and relieved of its congestion. The repair begins. The remains of the shredded membrane grow and a new one is quickly formed.

(4) After this repair there is a **stage of quiesence** lasting „for about twelve days. Together with the changes in the mucous membrane described above which affect only the body of the uterus, there is slight congestion in the cervix, tubes and the vagina, and a definite increase of secretion in all these parts.

During menstruation the woman feels heaviness and weariness, with slight loss of appetite. In many cases certain other constitutional disturbances, such as fever, headache, backache, etc., occur. Dark lines appear under or around the eyes. Existing diseases, if any in the system, tend to get exaggerated during this period.

There is much difference of opinion regarding the relation between ovulation and menstruation. But the reasons formulated by several scientists tend to make one believe that there are two groups of women, one in whom ovulation precedes menses and the other in whom it succeeds. More belong to the latter group. For those of the latter group, intercourse is most likely to be fertile soon after the period, and it is seen that the time immediately after menses is, with most women, the period of greatest sexual desire, and hence this period of greatest natural feeling in the female must be the time for fecundation in them. This, we observe in animals as well. But, as usual, there is exception to the general rule. In some people pregnancy occurs before menstruating even once. In a few, it takes place during lactation without the recurrence of menses after confinement. There are still others, though extremely few, who have become pregnant after menopause.

Menses lasts for about thirty years in the life of a woman, usually from the fourteenth to the forty-fifth. But in some it occurs even at ten and in others it lasts up to the fifty-fifth year.

Vagina is the canal where the male organ is introduced during sexual union. Its peculiar structure and mode of functioning make it specially attractive for the male to perform the sexual act. It has already been said that the anterior end of the vagina is narrow, its walls are muscular, lining membrane soft and thrown into folds. The vagina secretes a fluid during moments of great sexual desire. All these facts joined together help to afford the greatest enjoyment to the male during the sexual act. The secretion smoothens the vaginal walls and acts as a fine lubricant for the penis. An American writer describes coitus as follows:-- "Sexual intercourse includes endearments, caresses, a crescendo of sensation, general and genital; then five minutes or more of active intromission, with a climax of 15 seconds for both partners".

The average period of intromission is about 3 to 5 minutes. Regarding the frequency of intercourse in married couples, the same author may be quoted. "Judging from published and unpublished reports of thousands of couples, the usual habit of intercourse is once or twice a week with actual averages nearer twice than once a week. But ten per cent of couples cohabit daily or oftener over long periods. Pearl's report on frequency shows that with an average age at marriage of 25, the peak of activity in 257 men was at 35 years; this activity being sustained from 35 to 45, with ages 30 and 50 being about alike 25 and 55 comparable.

"Comparing different occupations, Pearl found that at the stage of greatest sexal activity farmers were the most active, business men and bankers next, and professional men least of all. One notes that those given to most frequent habit seem to reach the peak earlier than those less frequent; and the latter seem to spread their performance over more years".

Vaginal mucous membrane is said to be capable of absorbing semen and this acts as a powerful stimulant to the female sexual organs. This is the cause of the sudden and marked development, of the various parts of most girls soon after their marriage.

Hymen. The presence of an unruptured hymen is considered a sure sign of virginity. But, among women of some races hymen is unknown. It prevents an easy introduction of the penis. This resistance helps against rape to a certain extent. It also prevents the sexual act on young virgins by old and feeble men.

Clitoris is the seat of voluptuous sensations in the female. A large clitoris is considered by some as capable of producing greater pleasure and hence in certain parts of India it is artificially enlarged. Some people have a naturally large clitoris. It is the most sensitive of all the female sexual organs and it takes an important part in the producing of orgasm in women. In young persons clitoris is the exclusive seat of sexual enjoyment, while in the older, this sensation extends to the labia, the vagina, and the cervix. Some are of opinion that those who have large clitoris are sexually weak, and this weakness may be diminished by circumcising of the part.

Labia minora are very well developed in some women. They too are very sensitive appendages of sexual enjoyment, contributing in a large measure to the pleasure of the woman during copulation. It is considered that those who masturbate, develop a fairly big labia minora. Some races develop this part manually, thinking that its size increases the beauty of the part and is a source of attraction to the opposite sex.

Labia majora have only a protective function. They protect the sensitive parts beneath, and prevent the easy introduction of anything into the vagina, in an unwilling party.

Mons is the thick pad of fat, placed above the external genitalia. It acts as a soft cushion to the male pubic region during coitus, the absence of which will produce great discomfort to the male during copulation in the face to face posture.

Pubic hair. The growth of hair in the pubic region occurs in all people at the age of puberty. In the male the whole pubic region, the root of the penis, the scrotum, and the perineum get covered with hair. In the females it grows over the mons, the outer sides of the labia majora, and the perineal region, extending to the anus. In the early stages, this hair will be soft and curly; but later on, it becomes thick and straight. In quality and quantity, the pubic hair corresponds to that of the axillae and the eyebrows. Some say that thick profuse growth of pubic hair is indicative of severe sexual passion. The function of the pubic hair is just the same as that of the eyebrows, namely, to protect the parts below from the flow of sweat, and the skin from direct contact with that of the opposite sex during coitus. Frequent shaving of the pubic hair is considered to prolong the sexual vigor in both the sexes and so the practice has been long in vogue among the oriental people.

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CHAPTER IV.

Physiology of Fertilization.

Fertilization, or impregnation is a union of the spermatozoon with a mature ovum. Very little direct knowledge has been obtained regarding this phenomenon in the human beings. But it is studied in other mammals, and from that, it is supposed that this union takes place in the lateral part of one of the fallopian tubes. When ejaculation occurs, the semen rushes through the male urethra and is deposited in the vagina in several jets, during the space of twelve seconds. After the penis is withdrawn a large portion of the semen drains off itself. The spermatozoa contained in the remaining seminal fluid propel themselves by the rotatory lashings of their long tails and run up the uterus through the cervix, at a speed of about one-eighth of an inch per minute. In some, it is seen that the uterus occasionally sucks in the semen during intercourse and pregnancy follows such suction. A few women are conscious of this contraction of the uterus and its sucking action during the intercourse, and they calculate the date of confinent from the day of the impregnation. During the last six years, one lady has told me on three different occasions, that she had become pregnant the previous night, and later, on calculation I found that she was correct in her guess. What she said was, that on all those three occasions she had the greatest sexual desire, and while 'doing the act her uterus was severely contracting as it did during labour, and the cervix and vaginal walls were doing a sort of sucking in of the penis and the semen. Some other women also have ,corroborated the same fact from their own experiences.

From the uterus, the spermatozoa go to the fallopian tubes to meet the ovum, their bride, and usually the cleverest among them carry the day. It cuts its way through the outer membrane of the ovum by means of its headcap. The tail gets absorbed, but the head and body pass in and fuse with the nucleus of the ovum. Usually the bridal party comes back to the uterus together with all the unsuccessful spermatozoa, whose later fate is unknown. Thereafter, the development of the impregnated ovum

Sometimes the fertilised ovum is arrested in the tube, resulting in an abnormal form of pregnancy called tubal pregancy. Occasionally the spermatozoa pass the tube, get into the abdomen and meet the ovum in the ovary itself, resulting in an ovarian pregnancy. As soon as one spermatozoon enters the ovum, a membrane covers the passage and prevents any further entrance. But very occassionally two spermatozoa fuse with one ovum and develop into what is called a "Two-headed monster". In some women two or three ova are developed at the same time, and it is then that two or three spermotozoa get individual brides and produce twins or triplets as the case may be.

The impregnated ovum slowly passes down the tube and comes to the uterus in seven days time. There, it gets attached to some part of the wall which has been prepared for the same. It is then developed into the embryo-being. Thus conception occurs. The purpose of this book is to describe and discuss the methods of preventing or controlling this process of conception.

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CHAPTER V.

Surgical methods of Contraception.

Innumerable methods for the prevention of conception have been published by several authors. Having made a careful study of the various contrivances, suggested by noted people of the east and the west, I shall in the following pages describe and discuss the most important ones which are worth considering.

The different methods may be put under six headings.

(1) Surgical.
(2) Auto-contraceptive.
(3) Mechanical.
(4) Therapeutic.
(5) X-ray and radium therapy.
(6) Most Modern.

The surgical methods for the prevention of fertilization may be applied either to the male or the female. By the operation on the male, the semen is prevented from passing through the penis into the vagina during coitus.

This is a sure measure and several means are suggested for effecting it.

SURGICAL STERILISATION OF THE MALE.

(1) **Vasectomy*** is an operation by which the ductus deferens is divided, at some part of its course, from the testicle to the seminal vesicle. This can easily be performed by any surgeon within a few minutes. No elaborate preparation or assistance is necessary and it may be done under local anaesthesia. The skin incision is put below the external abdominal ring in the course of the spermatic cord, just as it is done for varicocele or an undescended testicle; or better, the incision may be put in the front aspect of the upper part of the scrotum just above the epididymus. A latero-posterior incision might get you nearer to the duct. The cord is to be separated from the other structures, the ductus deferens taken separately, and a portion of it, one to two inches in length, is to be removed. In the interest of the medical world, I may be permitted to describe the technic of the operation as it is done by certain American surgeons.

"Very careful preparation of the skin is done. The incision is usually on the front aspect of the scrotum just above the epididymus, but the rear location of the vas may some day make a latero-posterior cut popular, as this would enter so as to clear veins and nerves.

"The testicle is drawn downward; the whole spermatic cord is lifted in a line between the thumb and index finger of each hand, and the vas is rolled up just beneath the skin, standing out clearly between the finger tips. The vessels of the spermatic cord are readily separated from the vas, except with a very thick dartos. A double tenaculum or claw-tipped forceps, such as the Allis, sets its points through the skin as vas is held tense. Thus the duct is circled, and, as the handles are dropped over sidewise, the skin-covered loop is lifted, and the incision through the skin, from one-half to one inch, is handily made. Either thumb-forceps or clamps seize the vas and pull out a loop of an inch more. The tissues are stripped back about an inch with particular attention to the fine artery and the veins lying close to the cord. Sometimes, after clamps are placed, the vas is cut and the clearance of the loosely attached tissues behind it is then made. A clamp has the advantage over the grasp by tissue forceps in that the duct cannot slip out of sight. After the dissecting or pushing back of the loose tissue, a half-inch or less of vas is cut away. Oozing is searched for and a fine catgut suture ligature on a round point needle is used in case of doubt. If tissues are to be interposed between the ends a buried fine catgut continuous suture whips over three or four bites and the upper end is ligated with catgut of fine silk in the groove crushed by the seizure of the upper clamp. Then, if desired, the lower ligature is placed. After a final look for oozing, the ligated end is dropped, and a simple silkworm suture closes the skin, whose elasticity and contractility have shortened the incision. The wound is collodion-sealed, and then straps, bandage or suspensory hold the scrotum quiet. One or two days in bed or on the couch is the average requirement.

"Ligation of the upper cut end of the vas only is preferred to ligation of both ends, as ache, from distention of the epididymis is avoided and the pressure may open the lower end any way".

The author of this book has performed several operations of vasectomy, since the first edition of this book was published. It is found that the after-effects of the operation are wonderfully encouraging. It prevents the semen passing from the testis to the seminal vesicles, at the same time, it is produced in the testis and absorbed into the system, by means of blood and lymph vessels. The person loses his power of procreation, but retains his power of potency and all the other sexual characteristics. The general health improves and the capacity for work increases. Sexual vigour and the power for prolonging the period for orgasm during sexual intercourse are doubled, and the partner gets plenty of time to enjoy the act on her own part. The largest increase in weight that I noted was 17 lbs in two months' time after the operation, without any change in diet or surroundings. The case-note of that particular person may be given here.

K——aged 35, married 17 years ago, when he was quite healthy. Within five years' time, he became very weak and emaciated, on account of sexual excesses, as no other cause could be attributed to it. On an average he had sexual union four times a week. His erections became feeble, ejaculations premature, and the desire for coitus diminished, which he rarely enjoyed for more than a minute each time. The plight of his wife was even more pitiable. She was all disappointment. Having had no issue, she was accused as the cause of the change in her husband's constitution, was made the butt of ridicule by all in the family and in the neighbourhood. Neither could she secure any enjoyment with her husband after the change in him. Every time he had an intercourse, an emission followed which all the more worried him. He consulted all the Ayurvedic and Allopathic physicians he could reach, and tried all sorts of medicines, but the effect was imperceptible. Glandular extracts produced slight increase in weight in him. His wife too tried several medicines to become pregnant. Dilatation and curretting of the uterus were done twice, all to no effect. The only result was increased mental worry and serious disappointment.

When I saw him, on 23rd January 1933, he was emaciated, weak and pale. He had slight tremor of the hands and lips, with a little stammering in speech, and palpitation on slight exertion. His wife had left him and gone to live with her father, partly on account of the persecution of her sisters-in-law and partly also on account of her bitter disappointment in marital life. He was still getting three to four emissions a week. He was a shrewd and intelligent man, but could not concentrate his attention on anything for more than five minutes together.

His heart-beats numbered 108 instead of 72 as is in normal cases. His lungs, spleen, liver etc., were all normal. He weighed 92½ lbs.

Treatment. At first he was put on parathyroid pills for one month and the change in pulse was noted every fourth day. On the 23rd February his pulse was 82. On the 16th March Vasectomy was performed on the right side, and on the 1st of April it was completed on the left side as well. His weight decreased by 1½ lbs when noted after one week, perhaps due to the strain of the operation. But gradually his weight increased, emissions grew few and the quantity emitted became much less. When I saw him on the 5th of June he told me that his weight was 109½ lbs. He had brought back his wife and they were living together happily. He had normal erections and could enjoy for a long time. A small quantity of semen was ejaculated each time, which evidently must be the secretions of the seminal vesicles, the prostates and the urethral glands. His strength and sexual vigour had been doubled or trebled and he was attending to work without any fatigue. His pulse was 78 and he looked robust and healthy. The change in his wife was marvellous. The miserable unhappy woman, who had been absolutely disappointed of all happiness in life, and who was all but skin and bones when I saw her last, was transformed into a happy, blooming, buxom, young housewife. A photo of hers, before and after the operation on her husband, would have been an invaluable addition to this book. But! poor thing, she expects a baby soon. I had explained to the husband the facts even before the operation was done. If the wife were an educated lady, she could have been told about it all in advance.

The success of the operation is considered to be cent per cent, and the ill-effects nil, unless shabbily done. Dexterous care in isolating the vas, without injuring any of the numerous vessels in close approximation to it, is essential to ensure success. Neither I have noted, nor any of the surgeons reported any bad effects, such as atrophy of the testicles, decrease in potency, or any other mental or physical trouble. On the other hand, the sexual vigour and virility have increased as after-effects of the operation. This is one of the best and easy methods of contraception, as it needs be done only once in one's lifetime, and as there is no risk whatever so far as the desired end is concerned.

Another feature of great advantage in this operation is that reimplantation of the vas is possible and the function may be restored whenever desired. In one of my cases the divided vas rejoined by itself after two months, and I had to do it a second time, removing a larger part of it so that reunion may not occur again. In America it is found that reimplantation is possible in 25 per cent of cases with restoration of function as measured by the impregnation of the wife. Reunion of the vas after vasectomy can be prevented by taking certain precautions during the operation. One or one and a half inch in length of the vas may be divided and removed. But this proceedure wards off all chance of its reimplantation. An oblique cut of the upper end of the divided vas in such a way that the cut surface looks downwards and medialwards, and another oblique cut of the lower end of the vas so that its cut surface faces upwards and medially, will prevent the apposition of the two cut ends. By this the shortening of the vas is limited and it would be easier to reimplant the cut ends together when it is deemed necessary.

The publisher of this book, Mrs. A. Mathews, has had correspondance with the birth control information centres in the west, regarding sterilisation by vasectomy. Some of them are of opinion that there is a little uncertainty as to the position of the operator in the eyes of the law, if a healthy man is vasectomised.

There is no law against sterilisation as such, but there is a law against "maiming", passed in the days when the only method of strilisation known was castration, which unfitted a man for military service. So they think that if a vasectomised patient were afterwards to regret the operation and chose to take legal action against the surgeon for not dissuading him from having it performed, a prejudiced judge and jury might possibly cosider the operation a "maim," and punish the surgeon for it. I do not agree in this view. The law under section 320 I. P. C. with commentary is as follows.

"The term emasculation means the depriving of a person of masculine vigour, castration, injury to the scrotum, which would render a man impotent. A person emasculating himself cannot be convicted under this section. A person causing grievous hurt on his own self does not come within the purview of this section".

1. Vasectomy does not emasculate a person, as castration does. Instead of decreasing the masculine vigour of a person, it doubles it and the other virile qualities. He remains potent, but he is only sterilised.

2. Vasectomy does not produce any injury to the scrotum.

To be on the safe side, however, vasectomy should be performed with the written permission of the patient, the medical reason for the same being explained in it.

The law being clear, I am at a loss to understand how a doctor can be convicted of an offence for vasectomy on a person for reasons like prevention of conception to avoid danger to the health of the mother, to recoup the health of the father, and to prevent children being born to the insane and the leper. Only perverted minds would bring this within the limit of the law.

A sexual sterilisation bill is drafted in Germany. Primarily, it is intended to prevent the transmission of hereditary, physical and mental defects. According to the different items in the bill the following types of people have to apply and get themselves sterilised.

1. Those who had not reached elementary school standards.

2. Those suffering from hereditary deafness and dumbness.

3. Those who have epilepsy.

4. Permanent invalids within the meaning of the Insurance Act.

5. Those who depend on public assistance, to a degree that is to be arbitrarily determined.

6. Those who have been sentenced to imprisonment to varying terms.

7. Those who are deemed irresponsible for their actions.

Many of these are not hereditary. Epilepsy and certain chronic diseases may be cured. Many of the criminals and beggars, owe their disabilities to purely environmental causes. But, if sterilisation is strictly maintained on a voluntary basis, there in no room for complaint from any quarters.

In Germany, rewards are offered to persons of bad stock to induce them to ask for sterilisation. This proceedure is exposed to severe criticisms in other countries.

In males, Vasectomy is the generally applied method of sterilisation, and it is the most effective, easy and a permanent way of sterilising.

(2) Instead of division, **ligature of ductus deferens** is suggested. The operation is done in the same way as vasectomy, but the ducts are obstructed by means of silk ligatures in one or two places; ligatures are to be applied after constricting the duct by means of applying firm pressure with the artery forceps. The disadvantages with this operation are, that the duct is a thick cord and ligature may not

obliterate it completely, and that the ligature may not remain tight and effective for a long time.

(3) **Division or ligature of the ejaculatory ducts** are also the methods suggested. This is done by putting an incision like that of the suprapubic prostectomy. Isolation of the ducts may be a bit difficult except by an expert surgeon, hence this method cannot be attempted by all. But, if properly done, it is a sure method.

(4) **Division of the urethra** longitudinally, throughout the whole length of the penile portion, though a crude form of operation, prevents the semen falling into the vagina during sexual union. Copulation with such men effects sterility. A bistuary is passed into the urethra and it is cut through the entire length of its posterior or ventral wall, extending from the external urethral opening to the root of the penis. The incision is kept apart by means of a piece of lint or gauze, not permitting to rejoin during healing. This operation increases the width of the penis as well, which gives greater pleasure to the women during sexual intercourse. This is usually adopted as a contraceptive method by some of the aboriginal tribes in Australia, and indeed it is a sure and effective method. But

the great disadvantage is that inconvenience and great discomfort are felt during urination, as urine will be passed at the root of the penis.

(5) **Castration** is the complete removal of the testicles. This is a sure method and has been practised by the orientals from time immemorial. But this makes the man impotent. He loses all his secondary sexual characteristics, and no more does he show any manly quality. Hence this method of sterilisation cannot be recommended to any except for those who are to act as the watchers of the harem or for those with extreme types of nymphomania.

SURGICAL STERLISATION IN THE FEMALE.

(1) **Salpingectomy** (division of the fallopian tubes) is considered to be the best form of effecting sterilisation and is done largely in all parts of the world. When once the fallopian tubes are divided, the ova cannot come to the uterus, neither can the spermatozoa run up to reach the ova for fertilization, and hence this method is very sure and effective. The abdomen is opened below the umbilicus, and the tubes are ligatured in two places and divided between the ligatures. The chief care that is to be taken in this operation is to spare the arterial supply

of the ovaries entirely, lest they might get atrophied after the operation, and thereby potency of the person be lost. The technique of the operation need not be described here, as it is available to surgeons from books on surgery. The only comment to be made is, that the re-establishment of the cut end is possible in a few cases, unless the divided inner ends of the tubes are properly buried in the uterine wall, or the ligament. The operation is not difficult, but most people will not undergo the risk of an abdominal section for sterilisation alone. Many, on whom abdominal operations are done for other reasons, and who wish to get sterilised get this operation also done on them.

(2) **Ligature of the Fallopian tubes.** Instead of division, some surgeons ligature the tubes somewhere in the middle part. This also has all the risks and difficulties of an abdominal operation, and it is not so sure as the former method, as there is chance of the ligature getting loosened or absorbed later and make the tubes once again patent.

(3) **Hysterectomy** is, the total removal of the uterus. This is a very serious operation though a sure way of sterilising the female, but resorted to, only when the uterus is affected by diseases, such as tumours.

(4) **Ovariotomy**, is the complete removal of the ovary. This also is a serious, but sure method of sterilising if both the ovaries are to be removed completely. Nobody will get the ovaries removed for sterilisation alone. But it is done when they are affected by diseases which necessitate their complete removal.

Like that of castration, the great disadvantage of ovariotomy is that when it is effectively done to sterilise the female, the woman loses all her womanly qualities, becomes impotent, her secondary sexual characteristics disappear, and she becomes prematurely old.

(5) **An artificial stricture of the Fallopian tubes** may be produced at their uterine ends through the cervico-vaginal passage. "A sufficient burn by a chemical or an electric current applied at the tip of the minute funnel where the tube starts, results in a slough that ends in a circular scar that ultimately contracts firmly to shut off the opening. A probe tipped with the corroding chemical must remain in place, long enough to produce the damage, a time not yet determined; or second, the stricture is produced by a burn done by a platinum-tipped "Sound" heated by an electric current. The later test of the tube by air or gas makes sure that the closure has

been complete and effective''. A hysteroscope is essential to keep the part in full view. The shape and size of the uterine cavity are to be determined beforehand and it is usually done before a menses. The process is not any way difficult and the risks are much less than those in the abdominal operations. But the cases treated in this way are too few to draw a definite conclusion. Dr. Dickinson's method may be quoted:- "After the length of the cavity is determined, the cautery-sound is slid up against the external os so as to admit only this length. The possibility of pushing in farther and perforating is prevented by the sliding-shoulder fixed where needed. When the cautery-tip has been nestled into one upper angle of the uterus the current is turned on for from ten to thirty seconds, according to the vascularity of the lining, a succulent uterus needing a longer application of the current. A test is made by starting to draw the sound away. It should adhere rather firmly and bring away a shrivelled fragment of tissue all about it. Only in case the uterus relaxes, as it does during curretting, need one consider new sounding and renewed cauterisation at this session. Pituitarin may prevent this.

"The treatment is given soon after a menstrual period, or half way between periods. The two sides may be done at one treatment, or the second a few days or a month later. A douche is ordered in case of discharge, when the burn on the cervix which is used as control has turned into a firm scar, then the tubal scar also should be firm. The test of patency by insufflation should be deferred two months. The pressure need not go above 140 m. m."

(6) The famous gynecologist Green Armytage of the west London Hospital has suggested a new method of ligaturing the fallopian tubes per vagina. Incision is put through the anterior vaginal wall, and the uterus is brought down, the tubes are caught, ligatured in two places, severed between them, and then the parts are replaced in position and the wound sutured. This method is said to be comparatively easy and of less risk.

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CHAPTER VI.

Auto-Contraceptive Methods.

There are certain methods of contraception, which do not involve the use of any external agent, nor the help of any expert. The parties themselves after some-practice may select any of these methods as it suits them. For the sake of expressing this idea and also for brevity the term "Auto-contraceptive methods" has been employed, in referring to them.

(1) **Coitus interruptus**, also called **Onanism**, is the withdrawal of the penis from the vagina, when the semen is about to flow, and spill it outside. Though a very unpleasant method, it is practised by thousands all over the world. An instance of it is spoken of even in one of the books supposed to have been written thousands of years ago.

Its advantages are "Simplicity and availability at any time or place; the fullest local contacts between the parts of both the sexes, untrammelled by any material intervening or interfering; with no need of preparation or equipment, and no after-care needed".

However, the disadvantages are too many to be recommended to anybody. The pleasantest part of the sexual act is the time at which the orgasm occurs, i.e., when the penis makes a rhythmic movement and discharges the semen. That is the most untimely period to withdraw, whereby both parties lose the best part of the enjoyment. Many women do not get orgasm until this stage is reached. For such, the rhythmic movement of the penis striking the walls of the vagina and the sudden jerky fall of the semen over the cervical region of the uterus, constitute the culminating act in sexual enjoyment. If the penis is withdrawn just before this stage is reached, sixty percent of the women would not reach the stage of orgasm, and a large percentage of those who are not thus gratified, fall into a severe state of nervous strain and exhaustion with an extreme disappointment and often attended with bodily ailments like severe abominal pain. This might lead to certain nervous diseases such as hysteria, neurasthenia and even some forms of mania in women. In men also, it leads to some nervous diseases. A partial ejaculation and an incomplete passing of the semen together with a half-gratified sexual appetite produce a nervous weakening. Further, withdrawal does not assure safety from pregnancy in cases where men have quick emission. It is unsuitable for those who get orgasm earlier than their partners. The precoital fluid in the male urethra occasionally contains spermatozoa, and in such cases withdrawal will not ensure safety. About ten percent of those who practise this method seem to fail in their object. This may be due to the spermatozoa in the precoital fluid, or due to its re-entry after ejaculation out-side, as some of the sperm might remain in the urethra for some time after emission.

However, medical opinion seems to vary widely on the advisability of following this method. The Europian opinion on it was obtained by the National Committee' on Maternal Health in United States. They were informed by the French medicoes, that it is a very common practice in France and about two-thirds of them considered coitus interruptus harmless. Most of the gynaecologists and neurologists of France gave the same opinion. From my enquiries of the experiences of many married couples who have adopted this method for a long time, I find that the effects are most discouraging. Instead of the pleasant rest that both fall into, after a normal sexual union; after coitus interruptus, some get extreme prostration, others severe abdominal pain, while a few men get heat and irritation on passing urine. The opinion of Mrs. Helena Wright, Medical Officer, North Kensington Women's Welfare Centre, may be quoted.

"As far as I can see there is not one single good thing to be said about it. The result in families which have been driven to use this method for years is in my experience, almost invariably bad. There is a kind of irritability that we can recognise as directly related to this sort of practice."

I would strongly suggest that this method ought not be practised at any cost.

(2) **Coitus Reservatus.** Some people develop the power of keeping the penis erect for any length of time during coitus without emitting semen. This can be attained gradually by the controlling of the mind in a particular way. It has been tried by several and it is found possible to restrain the ejaculation till the orgasm in the woman is over. When this is possible it is a sure way of preventing conception. But it is not always possible, and when once it fails, the object is frustrated. Hence we cannot depend always upon this method.

(3) **Avoiding unsafe periods.** It is supposed that the ova is discharged soon after menstrual period or just before the commencement of it. Some people believe that fertilisation can occur only if copulation is effected during these days, i. e., the six days preceding and the twelve days succeeding menstruation. These eighteen days are considered to be the best fertilising period, and there are many who abstain from sexual union during these days in order to avoid pregnancy. According to this theory, only ten days in the month would be safe for union.

Several cases are known in which pregnancy has occurred in spite of strictly keeping up to this safe period for copulation. Though not certain, this method seems to be effective in a large proportion of cases.

It has been already said, that the spermatozoa can live in the vagina for some days retaining their fertilising capacity. They might therefore remain in the vagina or uterus, and fertilise the ovum that comes during the six days preceding the menses. Moreover, the exact time of the discharge of the ovum in relation to the menstrual cycle is not yet conclusively determined. The New York Obstetric Society made a report on this, a portion of which may be quoted here.

"Thirteen people observed over 1342 cases in which the day of an isolated coitus resulting in pregnancy was noted as calculated from the first day after the last day of menstruation, and among women whose cycle was twenty eight days long. All but eight per cent conceived before the twenty second day, all but twentyeight per cent before the fifteenth day, one-fourth of all the conceptions occurred in the first four days following the end of the period, and over half of all occurred in the nine days following the period". Some pregnancies occurred on one or other of all the twenty four days between the periods, thereby showing that there is no absolutely safe day on which pregnancy will not occur. Hence this is not a sure method.

(4) **Physical exertion.** It was often a wonder to many as to how the aboriginal tribes of Africa, America, India and Australia are not indiscriminately producing children, as those of the civilised countries do, in spite of the former not being acquainted with any up-to-date contraceptive methods.

Closer study of sexual habits of many of the coolies working in some of the tea and rubber estates in some parts of South India, has brought out a few important facts. All of them work from morning till sunset. They cook their food after returning from hard labour and go to bed late at night, take a well-earned rest, get up early in the morning and again go out for work. Sexual union among them is occasional and that too usually in the early hours of the morning after the fatigue of their hard day's labour is over. Soon after the sexual act, they get up from the bed to resume their daily routine. They first answer the calls of nature, take a wash and then attend to the morning's meal. Men might remain in bed a little. This routine among women might help against conception, though the parties themselves may be unaware of it. The straining during defecation and urination in a squatting position spills out all the semen from the vagina and the washing after that might clean off anything that might remain. While this exercises a natural control over conception among the working classes of the country, with the civilised cinema-going urban people and the rich, who usually have their sexual union soon after they go to bed and remain there till morning, spermatozoa have plenty of time to fecundate the ovum. Further, the women of the latter class do little physical work. They adopt a sitting, rather than a squatting posture during defecation and urination which throws comparatively less exertion on the muscles of the private parts and hence checks the flow of the semen from out of the vagina. There are a class of people in South India among whom the women assume the agressive part in the sexual act which is done in a sitting position over the men. Among them it is noticed that pregnancy is less frequent than among the other classes. The rate of increase of population in that particular community is only about half of the rate of increase of the other communities living in the same place. Physical exertion and strain in a squatting position helps much in spilling out all the semen from the vagina and thus preventing impregnation to a certain extent. Several forms of physical exercises are described for this purpose by some authors. Of all, I think the best would be to sit and stand on the toes, ten or twelve times with the hands on the waist. Coughing, sneezing, and straining, as during defecation and micturition, helps to contract the cervical and vaginal sphincters and drive the semen out.

"Tari reports that women of the poorer classes in Italy sit uprightin bed immediately after intercourse and by coughing in conjunction with pressure on the abdomen, effect the expulsion of the semen. Morton says that the native women of Australia, when they have had intercourse with a white man and wish to avoid impregnation, likewise deliberately effect the out-flow of the semen. The woman squats upright, with the legs widely separated and by a sinuous movement of the perineum and a simultaneous powerful bearing-down pressure, she expels the semen on the ground."

Some people are said to induce sneezing, soon after coitus by means of applying some astringent powder such as that of pepper or tobacco as they think that violent sneezing helps to expel the semen from the vagina.

The physical exercises and the other methods of straining described above, are fairly effective in preventing the spermatozoa from going up the uterus. But there are certain disadvantages in them also.

(a) It is the most untimely period to get up and do such exercises when both the sexes are immensely done up, by the exertion of the coitus, when they need a well-deserved rest. And every minute's delay will be increasing the risk of the active spermatozoa wriggling up the cervical canal.

(b) Sometimes the semen falls directly inside the cervix and a few of the spermatozoa might have gone up the uterus even before the ejaculation was completed.

(c) In some people the uterus sucks up the semen during the intercourse, as has been already described in a former chapter.

(d) Any amount of exercise, sneezing, coughing, or such other straining might not always expel all the semen. Hence this is not an absolutely sure method. But it is a fairly satisfactory one, especially because, without any instrument or expenditure, it ensures a fair amount of success.

(5) **Coitus Saxonus**. This name is given to the blocking of the semen during ejaculation, effected by pressure on the urethra at the root of the penis with the fingers, which drives back the semen into the bladder, for the time being. Later, it is passed with the urine. This is said to be practised in many countries. It cannot be very effective in all, as it needs fairly firm pressure over the ventral aspect of the root of the penis, and which produces some pain. Also it may not be always possible for all people to do it, during that exciting moment.

(6) **Abstinence** from sexual intercourse as a method of preventing conception is not worth mentioning. But there is a small percentage among married couples who adhere to abstinence merely with the object of preventing pregnancy. The medical enquiry conducted by the National Birth-rate Commission in England reported that abstinence is impracticable in the majority of young married people.

But it may be possible among the ascetic or the impotent.

Abstinence is hygienically imperative, when one of the partners is ill and during certain stages of pregnancy. (During the first three months at the time when menses ought to have appeared and during the last month of pregnancy, when even the slight pressure of the penis, gives great discomfort to the woman).

A prescription for total abstinence, in order to be practical and effective may be quoted here from an American book.

"You will need to develop, from the beginning, habits suited to your teaching and consistent with married celibacy and ascetic wedlock. You believe sex expression is sin, except for procreation. If this means four babies in the average twenty-five years of married life, you may have occasion for sex union less than twenty-five times, perhaps only four or eight times. Therefore beware of anything and everything that might start to rouse sexual desire or excitement, such as any bodily exposure. Arrange for separate rooms and baths, or separate bed, bathing and dressing. If only one bed, then to bed and out again at different times; no cuddling each other on winter nights; no contacts. Don't dress in bedrooms except alone.

"Cut down all caresses a kiss is to be perfunctory; holding in arms, rare and brief; no sitting close of evenings. Married love has dangerous opportunities until you become physically completely indifferent to each other.

"Curtail emotion, such as keen joys, shared griefs and deep spiritual stirrings because all strong mutual feelings may rouse desire for closeness and intimacy.

"Beware of quarrels. They end in reconciliation and affection. After months or years of rigid repression, having achieved success in developing complete physical indifference to spouse exert extreme watchfulness against others rousing starved feelings.

"Theatres, books, movies, pictures, must not be used as substitutes because they may prove powerful sexual stimuli. Avoid particularly any profound stirring from music and art and religious emotion.

"Your children must not be habituated to caresses or demonstration of affection in view of future completeness of repression when they come to marriage."

Vegetarianism. Recently I read in the book "Birth Control and Population in India" by Dr. Krishnamoorthi Iyer, that pure vegetarians are less prolific than non-vegetarians. A glance into the census reports of India of 1931 corroborated the fact. The Bramhins who are pure vegetarians in every place have smaller rate of increase in population than the non-Bramhins in the same area. The reason he suggests for this is that the vitamin-E, that is responsible for the sex element in human beings, is much less in ordinary vegetable food (except wheat) than in meat and fish; and this deficiency in the vegetable diet is the cause of the woman in the particular community being less prolific than in others. But I think that there are other factors also that are responsible for the low rate of increase among Bramhins. Their widows remain unmarried. Their men, at least on the Malabar side, marry from other castes and the children born of such marriages are not included among Bramhins. Their women are not married to other castes.

It is doubtless that a vegetable diet has less of an aphrodisiac effect than meat or mixed diet. The high priests among the Syrian Christians of Travancore are celibates. These saintly people are prohibited by rule and custom, from time imemoriam, from taking any non-vegetarian food. This rule might have been the result of the experience of the ancient sages, who probably knew more of the psychological physiological, and therapeutic actions of the various food materials than the new scientists, and therefore laid down the law of vegetarian food for the Syrian celebate clergy as least harmful as a sexual stimulant.

CHAPTER VII.

Mechanical Methods.

There are various mechanical methods by which the semen can be prevented from entering the uterus and causing impregnation. This may be done at any one of the several stages of the course of the semen passing from the penis to the uterus.

The penis itself may be covered by a closely fitting sheath and thus the semen prevented from falling into the vagina. The posterior end of the vagina may be blocked by some means or other, the cervical opening may be temporarily shut up by a proper door, or the cervical canal may be blocked by a properly fitting piston. Man's ingenuity has led to discover numerous devices. We shall take up and discuss the merits and demerits of each of these.

Sheath (Condom, French Letter) is a covering for the penis, cylindrical in shape like a test-tube. It is made of thin rubber or such other material and it closely fits the penis when applied over it. There are several varieties of it, made in various fashions. Most of them are made of India rubber. There are hundreds of manufacturers of these sheaths in Europe and America and the largest sale for them is also in those civilised countries. European makes are found to be about 7 inches long, while the American makes are half an inch longer. Laid flat, its width is about 2 inches. Its walls are thin and elastic, but at the opening it is thick and firm. It is kept rolled in itself and can be easily applied on the penis. Putting the centre of it to the penile end and unrolling the whole mass over the penis, the thick edge of the mouth of the sheath firmly fits on to the root of the organ, and thus it is prevented from slipping out during intercourse. Some varieties have got a teat at the closed end for catching the semen in it. This arrangement is not necessary as the rubber is very elastic and will dilate of itself. Further, this teat often gives some discomfort to the woman during action. Ordinary rubber sheaths are not durable, nor are they often safe, because, if old they give way during coitus without the knowledge of either of the parties. There is a particular variety made of the intestine of the sheep or calf and called **skin sheath**. These are more durable, but not so soft as the rubber variety. Hence these are to be softened before use; otherwise they might cause a feeling of roughness during coitus and interfere with the enjoyment. They are also costlier than the rubber kind, though durable. As they cannot be rolled, they are difficult to be adjusted. Many of them are besides unreliable as they contain holes.

If the vagina is rough and insensitive, as is in some rare cases, a particular kind of sheath made with rough surface, like that of the crocodile skin, may be used as this will stimulate any insensitive vagina to action.

There is another variety called the **Acorn form**, which covers only the glans penis. This kind is not well patronised, because of its doubtful safety, and as it also has the disadvantage of covering the corona of the glans.

Some directions may be followed in using the sheath.

(1) When it is bought, see that the date of its production is stamped on it, that it is not more than two years old and that it has been properly kept in chalk powder.

(2) See that there are no holes in it, by blowing it. When blown with great force, good varieties give way cross-wise near the base and not length-wise or near the tip, as the inferior types do. Superior makes will not have on them any speck, spot or blisters.

(3) See that it fits the size of the penis properly.

(4) If the duration of coitus can be prolonged by self-control, the sheath may be worn during the last stage of the act, just before the orgasm. If this is not possible it must be put on early enough. As the pre-ejaculatory fluid may contain spermatozoa, this is not always safe.

(5) The sheath should be lubricated before use lest it might easily give way. The best lubricant is some jelly, preferably contraceptive or some medicated oil, or vaseline; but vaseline damages the rubber on keeping.

(6) After the act, the sheath should be carefully rolled from the open end, (and not pulled off entire, lest it should tear away while doing so), and tested whether there is any crack or tear in it. If there is an antiseptic vaginal douche (to be described later) it should be immediately given.

(7) If the sheath is al-right, it should be cleaned well in cold water and dried by a soft towel or between two blotting sheets.

(8) When dry, it is to be kept folded up in chalk powder, if it is to be used again.

(9) If it is skin-sheath, special care should be taken in cleaning it well, lest ants eat holes into it.

Of all the mechanical methods, sheath is the most largely employed. It is patronised by the high class people everywhere; much less used in the east than in the west. It is more used to prevent infection of venereal diseases than to prevent pregnancy.

In the *Lancet*, dated 19th November, 1932, it is said, "In America, as in Europe, this (sheath) method is more generally used than any other, except coitus interruptus. The fifteen chief manufacturers in America are reported to produce 1,440,000 of these articles a day, and according to Dr. Harmsen, a leading German firm of manufacturers sells no less than 24,000,000 a year". From this we can more or less guess how largely the Western people patronise these contraceptive methods.

The **advantages** of the sheath are:—

(1) It is available in every town.

(2) It can be easily applied.

(3) It is harmless.

(4) It ensures safety if carefully and properly worn.

(5) It is particularly valuable in cases where one of the parties is suspected of suffering from venerial diseases.

The **disadvantages** are:—

(1) It needs some cost which all cannot afford to pay for.

(2) Some care is necessary in using it to ensure safety.

(3) In spite of the best care the sheath might give way, and then other means have to be employed, to be on the safe side.

(4) The pleasure during coitus is much diminished for want of contact between the parts, as the sheath intervenes between the sensitive skin of the penis and the erectile vaginal mucosa.

(5) Women who reach the climax only when the semen falls on the cervix will be deprived of the best part of the enjoyment as the semen is caught inside the sheath.

(6) Washing and keeping the sheath for subsequent use, is a delicate affair especially in a large family.

Many people who use sheath have expressed the opinion, that they use it out of sheer necessity, and knowledge of any better means would make them discard this at once.

Female Sheath. There is another kind of sheath, made of thin rubber to be worn by women during coitus. It is fixed into the vagina which fits it well. Its mouth is firm and remains at the vaginal orifice. During coitus the penis is introduced in to it and the semen is collected in it. This is safer and surer than the male sheath, but it minimises sexual enjoyment to a grater extent and as such few people seem to use it. It is more easily adjusted than the male sheath and it does not burst so easily during coitus.

At the medical conference on Contraception held on July 8th 1933, in London, Dr. C. I. B. Voge Ph. D., said that sheaths might be more favourably regarded if they were purchased only from reputable shops, and that "Durex" type is the best, being made of rubber which had been coagulated by hot water instead of sulphur.

Lime or Orange Cap. In olden days, people used to introduce a halved-piece of lime or orange into the vagina and obstruct the cervico-vaginal passage. A lime is cut into two and a small depression made in the centre of the pulp of one of the half-pieces. The hollowed part is introduced into the vagina just before coitus, and pushed up as far as possible with its convex outer side outwards. The vaginal portion of the cervix is fitted well into the depression made in the cut surface of the lime; thus the cervix is completely shut up from the vagina. A glass lemon-crusher which is available in the market at a small price may be used with advantage in scooping out the lemon or orange.

This process is advantageous in as much as:—(1) It is easily available, and can be easily practised.

(2) Its juice is acidic and inimical to the spermatozoa, thus acting as a spermicide.

(3) If there is any venereal ulcer or fissure in the woman the limejuice will produce smarting, which will be warning to the man. In some places lime is largely used for this purpose, as a test for syphilis.

At first, it must have been used with the object of obstructing the cervical opening, and the originators of the modern pessary might have caught the idea from this ancient practice. Anyhow, this ancient practice is an easy, handy and fairly effective method and it can be easily removed entire with the fingers. One must be careful to select the lime, of proper size and make a fitting depression in it and fit it well, lest it should shift position. Some practice will enable any woman to use this correctly and effectively.

Lime is to be preferred to orange, as the covering of the latter is rough and as it exudes an astringent juice on pressure which might smart the organs

Cotton tampon. A ball or tampon of cotton may be introduced into the vagina and kept in front of the cervical opening as a mechanical blockage. Some cotton is taken and made into a ball, and a thread is tied in the middle of it. (See Fig ~~9~~). 12 This is dipped in water, or better in some contraceptive liquids such as honey, jelly, carbolic lotion, alum soloution, vinegar, lime juice, neem oil, etc. Then, it is slightly squeezed and introduced deep into the vagina and kept adjacent to the cervical opening, before coitus, just as the lime is kept, with the end of thread remaining outside. The cotton may be adjusted to the cervix and the fornices and the covering made complete on all sides. After coitus, an antiseptic douche may be given to clear the vagina of the semen. The cotton can be removed by pulling out by the thread. Douche may be unnecessary if the cotton is dipped in some contra ceptive before introduction.

This also is an easy and handy method with a fair amount of success. During emergencies even a piece of cloth or handkerchief may be used instead of cotton. A small badminton ball or some such ball of wool also will do equally well.

Sponge. A piece of sponge may be used instead of cotton. The sponge is cut to the shape of a semi-hemisphere with a depression on the plain side of it. A string may be tied to its centre and used as the cotton. The size should be adjusted for each individual in such a way that when placed deep in the vagina, it does not produce discomfort by its being too big,neither should it be too small and get displaced during intercourse. For patients with cystocele, rectocele and markedly relaxed perineum, the use of sponge would be the most apt method. A rubber sponge ought to be preferred to sea-sponge, as the former can be squeezed to a greater extent, cleaned better, boiled without damaging, is of great uniformity in texture and quality,and is also smoother and softer. Before intercourse, it is dipped in some spermicidal solution. Nothing need be done after coitus and the couple can comfortably rest after the act. The next morning it is pulled out by the thread. To be surer, a douche may be given before taking out the sponge. This, I think, would ensure ninety-nine per cent safety.

Pessary. The method of blocking the vagina by means of the lime, sponge, cotton, wool, etc., has been improved upon by perfected appliances which are called pessarys. Formerly the name pessary was applied in gynaecology to the contrivance by which displacements of the uterus were adjusted in the vagina. Now the word is applied to the several kinds of caps, diaphragms, etc., that are placed in the vagina with the object of preventing conception. We shall take up the modern varieties of pessary one by one.

Vaginal diaphragm or Dutch pessary. It is a flat cup of rubber, or some such material, with a firm elastic rim, made of metal-spring or rubber itself. It is applied at the posterior end of the vagina with the dome forwards or backwards in such a way that the posterior parts of the vaginal walls get slightly distended and firmly fixed to the rim. By this the cervix and the fornices are completely shut off from the rest of the vagina. It acts by distending the elastic walls of the vagina and forming a diaphragm-like barrier, dividing the vaginal cavity into an anterior and a posterior chamber. It can be easily put in place by anybody. A single demonstration by any doctor or midwife will enable any woman to apply it herself. It may be put in position just before intercourse, and removed early morning after a douche.

It is best introduced in a squatting position on the heels with feet apart and knees bent. Holding the pessary between the thumb and the index finger of the right hand, as shown in fig. 9, introduce it into the vagina and push it as far in as it will go. Then with the index finger, press the rim on all sides and see that it is firmly fixed on all sides. If the pessary is in proper position, the cervix can be felt as a hard knob by the finger, through the thin rubber of the dome of the pessary, as in fig. 11. Further, if the person bears down in that

Introduction of the Dutch pessary.

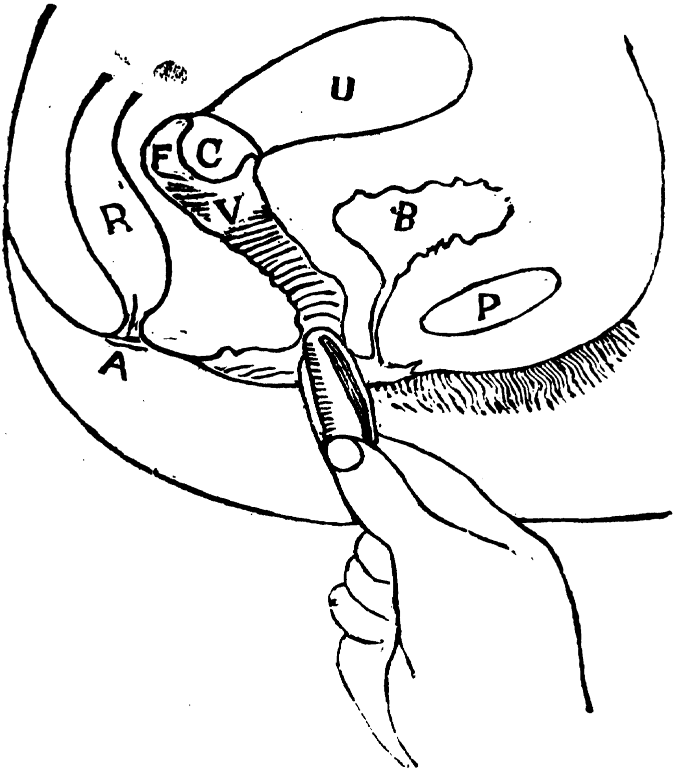

Fig. 9.

U.	Uterus.	C.	Cervix.
B.	Bladder.	P.	Pubis.
V.	Vagina.	A.	Anus.
		F.	Fornix.

The rim of the pessary is felt with the index finger behind the hollow of the Pubic bone.

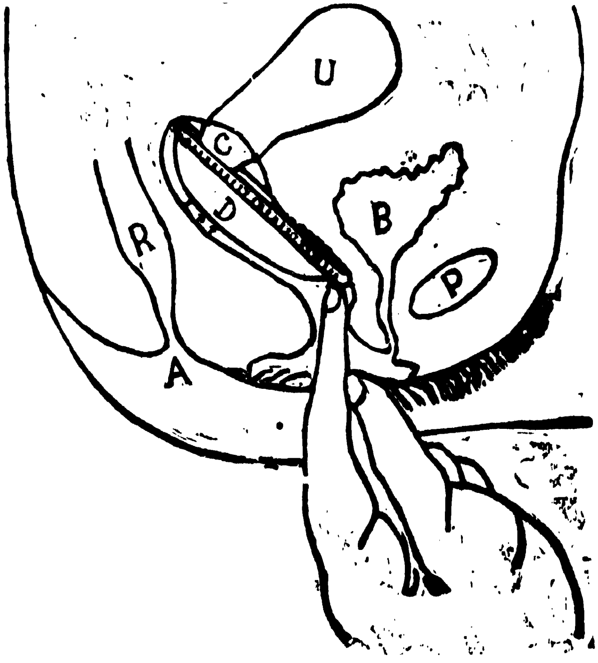

Fig. 10.

The cervix is felt through the thin dome of the Dutch pessary with the examining finger (EF).

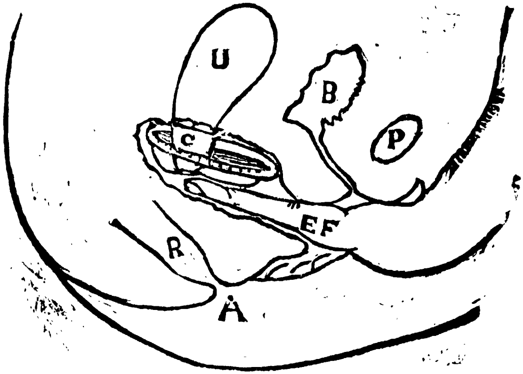

Fig. 11.

position, the rim will move a little downwards and again slip back into its place. But, if when straining in that position, the rim passes down the bone that is felt in the front part, it cannot go back into its position, and the pessary is too small for the particular person. If the pessary is fitting properly, the wearer will not feel its presence, except when touched with the fingers. Removal of the pessary also is easily done, by hooking the index finger to the rim at the anterior margin and pulling it down. The size of the pessary should not be too big to produce discomfort to the woman, nor should it be too small to slip out. In virgins and the newly married, a small diaphragm will be sufficient, but later it will have to be changed for a bigger one, and after child-birth a still larger size will have to be used. The most proper sizes for English women vary from 67·5 to 77·5 m. m. for Americans from 70 to 80 and for Indian women it would be from 65 to 75. The correct size and position of the pessary can be verified by passing the index finger. If it can be passed with little or no pressure over the rim of the pessary, it may be considered small and might get dislodged during intercourse. Removal of the pessary can be done by the person squatting and pressing down herself if it cannot be easily reached by the fingers in other positions. Every morning it should be removed, cleaned, dried and kept in chalk powder, as otherwise it will get spoiled. A pessary properly preserved lasts for two years. A case is mentioned in the *Lancet*, of a woman who used the same pessary and syringe for five years. This seems to be an extra-ordinary case. Every time before using, it should be carefully looked into for holes. A rubber pessary should not be retained in the vagina for more than 12 hours, lest it might produce leucorrhoea (white discharge). It is better that a douche is given just before and after the removal of the pessary.

In a stout lady, with much fat over the abdomen, the cervix will be situated far behind and will not be within reach of the short fingers such people usually have. In such cases another's help may be necessary, or she may be taught to place it correctly with the help of a director or a sponge-holder. In one who has cystocele (prolapse of the bladder into the vagina), the anterior vaginal wall will be hanging low. This prevents the proper placing of the diaphragm. For such people a peculiar kind, called Matrisalus type, is used by which the prolapse is held up.

Safety from pregnancy by the use of pessary in Holland was estimated to be 85 per cent.

In Cambridge it was calculated to be 93 per cent success. Konikow, in America, tried it on about 400 patients in private practice and obtained 97 per cent success. The advantages of the vaginal diaphragm are that, (1) it can be more easily applied and withdrawn by the user herself, than the cap; (2) slight differences in size (of the diaphragm) do not affect much; (3) it does not matter even if the cervix is short or long. The disadvantages of the diaphragm over the cap are:—(1) It is more costly about ~~Rs~~ 2 in India. (2) It distends the vaginal walls, which is unconfortable to the wearer and does not give the tight grip of the vagina over the glans penis during intercourse. (3) The Dutch cap is not suitable in cases of prolapse or of usual constipation, in which cases it gets compressed and distorted.

Caps. These are pessaries made of rubber, metal or celluloid, which closely fit the vaginal portion of the cervix and thus shut the cervical opening from the vagina. The cervix projects into the vagina to about one-third to half an inch and to this portion a tightly-fitting cover is applied. This is suitable for those who have a fairly long and projecting cervix which can be seen with the help of a mirror, while squatting.

If a mirror is placed flat on the floor and the woman squats behind it, she can see her perineum, vagina and all other parts reflected in it. Slght adjustments may be necessary to have a clear view of the cervix. It may not be possible in a fat woman with a deep vagina and short cervix.

Various kinds and sizes of caps are in the market. Each can and must select her own size and liking. A pessary or cap bought through the post will be as useless as artificial teeth bought from the market. An unfit pessary might even turn out to be dangerous. A cap can be easily slipped in with the fingers and fitted on to the cervix with the mirror in front. It is held in position by means of the pressure of the walls of the vagina and the sticky nature of the cervix. The great advantage with the cap is that it is not dislodged during intercourse. The rubber caps may be withdrawn, cleaned, dried and kept in chalk. To be surer, a douche also may be given. Withdrawal of the cap is not difficult as it can be easily pulled out by means of the silk-thread that is attached to it. If it is kept for long, there is every chance of producing catarrh of the vagina and the cervix with the consequent white discharge, producing a foul odour. Hard cervical caps, made of celluloid or metal, are largely used in Germany, Austria and Switzerland. The best metal used for this is silver as it is slightly antiseptic and self-cleansing. The silver caps can be kept for long with the least harm. The proper size of the cervix is measured by an expert and the cap is made for individuals, and the fitting is as easily done as the rubber variety. The fitness of the cap can be tested by the husband with the help of a test tube as big as that of his penis and an electric pencil-torch. The closed end of the test tube is pushed into the vagina and the torch lighted inside it through the mouth. He can have a good view of the position of the cap over the cervix.

Celluloid caps are largely used by prostitutes in all civilised countries in the west. Professor Pinkus of Berlin is of opinion that these caps help greatly in limiting the serious effects of gonhorrea in the female. Another advantage of this cap is that it does well in those who have cysotcele. A rubber cap does not suit a fat woman as her cervix cannot be easily reached. If she is particular to have a cap, she must go in for a silver one, which ought to be fitted and removed only by an expert. This may have to be done once every month, application after menses and removal before the next period. The great disadvantage with such caps that are left in position for a long time, is that they prevent the secretions from going down. Damming back of the secretions into the uterus might cause inflammation of the endometrium (mucosa of the uterus) and the tubes.

A passage from the *Lancet* of 22nd October 1932 may be quoted here. "The possibility of injury caused by the damming back of the cervical secretions has been frequently discussed. The possibility especially arises in connection with close-fitting cervical caps made of metal which, in certain continental countries, are placed in position at the end of a menstrual period and left in situ until dislodged by the menstrual flow occurring at the next period. Retention of secretion is unlikely to occur when a rubber cervical cap is employed which is placed in position for short periods of not more than ten hours. It is specially improbable if the rubber cap has a high dome. With this and the so called Dutch pessary (vaginal diaphragm) which roofs over the vaginal vault fitting anteriorly above the symphysis pubis and behind in the posterior fornices, the danger is negligible".

A cap though a little less costly, by about a Rupee is more difficult to be introduced than a Dutch pessary. It cannot be fitted to a person who has a short cervix, or a cervix that is scarred or distorted in shape on account of tears that might have occurred during labour. In a deep vagina also it is difficult to be adjusted. In spite of all the trouble and the cost involved, it is doubtful as to whether the spermatozoa cannot wriggle up the sides of the rim of the cap. For it has been observed that a certain percentage of those who use it constantly have failed in their object. It is safer to smear the rim with a spermicidal ointment and give a douche of soapy water the next morning before the cap is removed. In spite of all these cares, Dr. C. P. Blaker states, that there were 83 failures in 6081 cases analysed, which is just a little over one per cent.

The great advantage of the cap, in the words of Marie Stopes, is:—"It offers the very minimum of interference with the romantic side of the sex act........ The man has no discomfort from its use, for generally his penis cannot detect it is there." But like the diaphragm and all the other mechanical devices described above, the cap does not allow the direct fall of the semen over the cervix during intercourse, which contributes largely in producing the orgasm in many women.

Intra-uterine mechanical devices. Various kinds of intra-uterine mechanisms have been invented to prevent pregnancy. At first, an improvement on the metal cap was made whereby a stem ran up the cervical canal and fixed the cap in position. For some time this was in great repute, as it could be kept on for some long periods and interference was not necessary. But it was found that the stem produced an irritant action on the uterus. The uterus begins to contract and slowly pushes out the stem. Further, the cap of the stem had all the disadvantages of the "cap" during intercourse, in-as-much as it did not permit the direct contact of the briskly oozing semen with the cervix. Hence, the stem and the cap below it were made in such a way, that the few disadvantages could be eliminated. The size of the cap was reduced to that of a shirt stud and the stem was lengthened and various other improvements made on it. An enlargement was made at its top, so that it might not be easily pushed down the constricted internal os (cervical opening in the uterus). (see fig. 12). Long V-shaped springs were made which could be closed and introduced; when it reached the uterine cavity it widened and assumed its original position. The Y-shaped, or wish-bone pessary was made, in which the spring did not affect the walls of the cervix. Another form was like a big collar button. A German variety was introduced

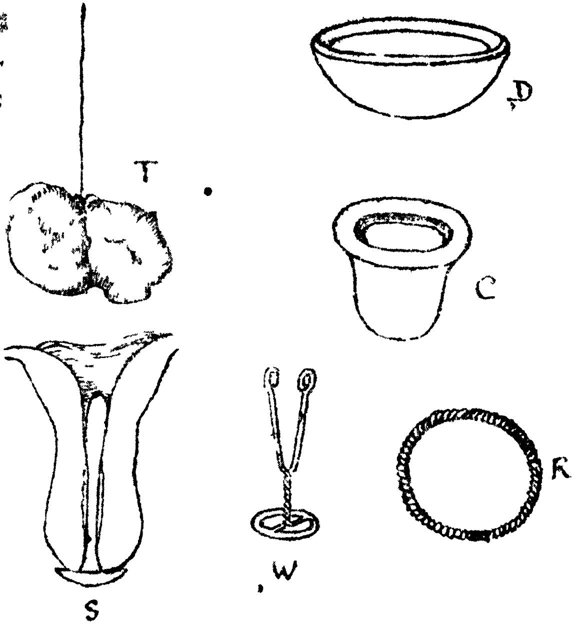

Fig. 12.

T. A ball of cotton tied on a piece of thread.
D. Dutch Pessary or Vaginal Diaphragm.
C. Cap.
S. Silver stem pessary.
W. Wishbone pessary.
R. Grafenberg's Silver-ring.

which contained a silk-worm circle at the end of the stem which prevents the easy slipping of the pessary. Innumerable kinds with small differences were invented by the wits of several men in France, Germany and other European countries. All were largely patronised during their earlier stages of invention. But later, it was found that, the numbêr sold have been enormous, the forms various, accidents serious, and protection uncertain.

The disadvantages are numerous. The proper fitting of any kind of pessary is possible only by an expert gynaecologist and that with great difficulity. In many cases intra-uterine inflammation, endometritis and cervicitis occurred among those who used the one or the other of these. Haemorrhage and pain were not rare symptoms in many. Any foreign matter introduced into the uterus produces a stimulation to the uterine-muscles which begins to contract, and uterine contraction makes it expel its contents. This resulted often in the intra-uterne mechanism being pushed down with the pain of the unusual uterine contraction, which the woman alone could know. Normally, the constriction of the cervical os and the mucous discharge of the cervix prevent any bacteria running up the uterus from the vagina which is often exposed to all such germs. Now, the pessaries described above formed a fine ladder for these germs, where by they ran up the uterus and set up imflammation.

Rawl made an extensive study of this subject and gave his opinion that even in expert hands, salpingitis (inflammation of the tubes) occurred in 7 per cent. In a few the studs have been broken and the stem worked upwards. Cases have been recorded in which the branches of the V and Y of the wish-bone pessary eroded the uterine walls and perforated into the peritoneal cavity, with serious cousequences.

Dr. Dickinson says that a case is reported in which the stem produced perforation of the uterus during coitus and caused death. Several such serious consequences have resulted following the use of intra-uterine stems, and now they have all been thrown aside.

Grafenburg Ring. Dr. Grafenburg of Germany has recently invented a device which is of great reputation today. It took 10 years for him to develop it into the form now in use and at present, it is considered to be the best form of contraceptive device in Germany. It consists of a circular spiral ring made of fine silver wire. At first he used silk-worm guts in the form of a star, and later in circles, the shape being kept up by means of silver wires. The size is to be determined according to the size of the uterine cavity which may be fairly gauged by the sound. The vagina is well washed with some good antiseptic lotion. The ring is well sterilised and introduced by a sound with a notch at the end. Some dilatation of the cervix may be necessary, which can be done with the help of Hegar's dilators. No anaesthesia is necessary. The ring will be squeezed into a leniar form, when it is pushed up by the sound. When it passes the internal os the sound may be withdrawn. This method is contra-indicated in gonhorrea, menorrhagia salpingitis or any other inflammatory condition. Pain, lasting more than a few hours, or tenderness in the abdomen, indicates its immediate removal. A discharge from the cervix is a sign that the ring is too big. It can be removed at any time with the help of a polypus forceps. If its position cannot be located by means of a sound, X-ray will have to be employed to find its position. The effect of the ring as contraceptive lies in its subjecting the mucous membrane to the gentlest of friction, while preventing implantation or chemically discouraging the sperm from travel. Vogue suggests that the action of the silver may play a part in the sterility produced, especially since the site of action differs considerably from that in which chemical contraceptives are usually employed. For example a solution of collosal argentum of a strength of ·06 percent is a prompt spermicide. Hence it may be surmised that silver acts more like a spermicide than an abortifacient. It will remain for long in the uterus just like the silver sutures in bone surgery. Grafenberg believes the effect of this irritant to be premature development of changes in the mucosa which is thereby unsuited to nest a fertilised ovum. After removal of his silkworm circles, Grafenberg says pregnancy has started at once in numerous instances.

The most distinguished German gynaecologist, Professor Robert Mayer of Berlin, seems to have given his opinion that no inflammatory changes were noted in the currettings of Grafenberg's cases. In a case of hysterectomy, Baberg seems to have noted the lining of the uterus normal, in which Grafenberg's silk-worm gut has been kept for four years. At Zurich, Grafenberg reported that silk-worm gut showed 3·1 % failures and the diameter of the ring varied from ¾" to 1". At the International Birth Control Conference at Zurich in 1930, a paper was read in which Grafenberg gave encouraging statistics. He showed that silver was cent per cent success regarding its contraceptive effect, and inflammatory changes in the uterus due to it were nil; but he said that with the silk-worm thread inflammation occurred in a small percentage.

A passage from the *Lancet*, of 22nd Oct , 1932 may be quoted:— "In a recent report given by Hans Guggisburg of Switzerland, it is said that attempts to prevent conception by the introduction of intra-uterine stems of silver rings such as that of Grafenberg, are by no means always successful. He quotes H. Gummert's report of 92 cases in which pregnancy occurred after use of one or other of these methods, 73 of these pregnancies ending in abortion, usually septic. Guggisberg holds that tubes or rings often give rise ultimately to tubal pregnancy, because of the permanent changes set up in the tube following inflammatory complications. He deprecates also contraceptive methods involving the use of vaginal occlussive pessaries which in his experience may lead to sepsis, by causing retention of secretions. Attempts at criminal abortion are not infrequently made in patients who have tubal pregnancy with disastrous results, such as rupture of the fallopian tubes complicated by sepsis. In England Grafenberg ring method is now generally regarded as unreliable and potentially harmful". On closely studying the reports of the several gynaecologists who have tried these rings, it is seen that failures are due to one of the following causes. (1) Improper size of the ring. (2) Improper sterilisation of it before introduction. (3) Improper selection of the person on whom it is applied.

Of all the intrauterine methods of contraception, the silver ring gives the best result. It is very extensively used in continental countries. The chief advantages of it are:—

(1) It can be kept for long. (2) It is a sure and effective method if properly done by an expert. (3) Both parties can enjoy sexual union to the fullest extent without having even a faint' idea of the presence of anything foreign.

Disadvantages are noted in a small percentage of people in whom it is contra-indicated, and must be removed at once. In a few, replacement by a different size has worked well.

Finally, a passage may be quoted from the *Medical Annual* of 1931 regarding the use of intrauterine methods of contraception.

"In view of the existing present-day use of contraceptional methods, the following table compiled by A. Geist, of the Gynaecological Clinic of Zurich, indicates only too clearly the risks which women incur by the introduction and the wearing of instruments in the uterus.

Various objects are apparently used; e. g. brushes, sterilets, obturators, and intrauterine pessaries.

Inflammation inside the abdominal cavity	61
Inflammation of the ovary and tubes	17
Uterine pregnancy	62
Tubal pregnancy	4
Inflammation of the uterus	78
Excesssive bleeding	60
Menstrual pain	28
Perforation of the instrument through some part	9
Death	17

"The publication of this list of fatal and serious complications recorded in gynaecological literature should damn for all time the perinicious practice of the introduction of foreign bodies into the uterine cavity for the sole purpose of preventing conception. Apart from the risk to life from peritonitis and suppurative conditions in the fallopian tubes and ovaries, it is particularly interesting to observe that Reist publishes records of sixty-two cases where pregnancy occurred whilst the instrument was still in situ".

CHAPTER VIII.

Therapeutic Methods of Contraception.

Hundreds of medicines are being advertised in various forms for preventing impregnation. They effect contraception not by blocking the passage to the uterus, neither do they hinder the production of the germ-cells, but they kill or paralyse the spermatozoa, which is effected as soon as they come to the vagina, thereby preventing their running up the uterus to meet the ova. Any contraceptive drug selected must possess the following qualities.

1) It should actually kill the spermatozoa and not merely paralyse or damage them; if only paralysed, they might revive and lurk behind somewhere, run up and fertilise later. If only damaged by the drug, they might go up and fertilise, in which case there is a chance of an abnormal development of the foetus, but no statistics ever showed an increase of abnormal

children brought forth since the development and universal use of the chemical contraceptives.

(2) The solution of the drug in the vagina must have only a low surface tension, as a high surface tension does not permit it to come in contact with the small crevices in the several folds of the vaginal wall.

(3) The drugs' selected must be such as would dissolve easily in the vaginal secretion and the semen, as otherwise it will not effectively destroy the spermatozoa.

(4) They should not be poisonous lest they might be absorbed and cause ill-effects in the system.

(5) They should not be affected by the acidity of the vagina or the alkalinity of any pathological discharge, so as to diminish their spermicidal power.

(6) They should have no unpleasant odour.

(7) The solution should not stain the clothes and leave traces, which women out of modesty would not like.

(8) The drug should not be irritating to the vagina.

(9) It must be cheap and easily available.

(10) It would be better if it could be antivenereal also, so that it may avoid infection and may have besides curative qualities.

(11) It must be such as can be kept for long time, under ordinary circumstances, without changing its composition.

(12) It should be such as can easily be introduced so that it might be done effectively and with moderate care.

Contraceptive drugs are in the form of liquids, jellies, oils or solids. Each form shall be dealt with separately.

LIQUIDS.

Liquids are applied as douches into the vagina before or after the sexual act. If applied before the act it does not remain there, and hence is not of much use. So it is given soon after the coitus. The douching apparatus consists of a can, made of enamelled metal or earthenware, in which water or the liquid to be douched are held and kept at a high level. At its lower part, there is a nozzle to which a rubber tube of about a yard in length is attached. The other end of the tube is connected to a stoppered nozzle. This nozzle is about 8 inches long and contains a number of holes, one at its end and the others concentrically placed. When the can is filled and the stoppered nozzle held at a lower level than the can, the liquid flows through the nozzle at a good pressure on all sides. In applying the douche, the can is filled with the liquid, fixed on the wall or placed on a high table; the woman lies in a reclining position, or sits up, or better squats on the floor; the stopper is opened, and the nozzle is thrust into the vagina as deep as possible. The liquid rushes into the vagina and flushes the semen out. This is best done soon after the coitus. The important precautions to be taken in applying the douche are:— (a) It should be done immediately after the sexual act. Every minute's delay might make the spermatozoa run up the cervix, and the douche may be too late to drive all of them out. (b) The nozzle should be held tight at the vaginal orifice both with the help of the vaginal sphincter muscles, as well as the hand; otherwise, the liquid might not reach all the interspaces between the folds of the vagina, where spermatozoa might lurk and run into the uterus afterwards. The tight grip of the nozzle at the vaginal orifice increases the pressure of the finid inside which makes it distend the vaginal walls and bring all the parts in direct contact with the spermicidal fluid. (c) The pressure of the fluid should not be too much as to force the fluid up the cervical canal. The pressure can be regulated by placing the can only about two feet above the level of the vagina. If the liquid goes up the uterus it might cause sepsis and several other complications consequent on that. (d) Douches should always be given warm.

In the absence of a douche-can, fairly satisfactory results can be obtained by proper washing with the liquid, as is ordinarily done by many in the east, especially by the poor country folks. But this cannot be satisfactorily done in those who have a deep vagina, still it may be done when nothing else is available. Various liquids may be used for the contraceptive douche.

(1) **Ordinary water** paralyses the spermatozoa on coming in contact with it. But it does not kill the spermatozoa, so any which might be retained after the douche might revive and run up the uterus. But when nothing else is available it may be used.

(2) **Decoction of Neem** (Melia Azadirachta)leaves, may be used effectively as a contraceptive douche. It is boiled in water, and the decoction is decanted beforehand. The bitter principle contained in the neem is a good germkiller. Instead of the douche-can and its parapharnelia, an ordinary tailed vessel "Kindy", which is available in most Indian houses, may

be enough for this purpose. The decoction is kept in the vessel and the tail pushed into the vagina in a squatting position. The fluid flushes the semen satisfactorily.

(3) **Decoction of Tamarind** (Tamarindus Indicus) leaves, can be prepared and used just as the one described above. It contains an acid which has the property of killing sperms. This is very suitable for the poor people, as it is easily obtained, equally easy of technic, and does not cost anything.

(4) **Lemon Juice** contains 5 per cent citric acid. It is one of the best of spermicides. An ounce of it in a quart of water will be quite sufficient for a douche. Besides being a spermicide, it has an anti-gonhorreal action as well. It is easily available and quite handy. It has no bad smell or colour, neither does it do any harm.

(5) **Vinegar** contains 5 per cent acetic acid. When diluted with water (one dram to an ounce), it acts well as a spermicide, and can be used with great effect in douching. This also is easily available and largely used, being cheap and harmless. But unless diluted well, it smarts the penis.

(6) **Common Salt.** One teaspoonful of salt to a pint of water is very effective in

killing sperms. This is the handiest of all the drugs and is available in every house. It is cheap, harmless and as effective as the former.

(7) **Alum** is a salt available in almost all the shops. It is an excellent spermicide. It dissolves well in water, and a dram to two pints of water will be sufficient to kill any number of spermatozoa in a few seconds. Alum has another advantage in that it will contract the relaxed vaginal walls. Hence it is the most appropriate douche for multiparous women whose vaginal walls have become loose; and the necessary tightness of the vagina for sexual union will be regained. It is cheap and has all the qualities of a good contraceptive.

(8) **Boric acid** is not a good contraceptive for use in douching, as it does not dissolve to the strength necessary to kill the spermatozoa. One in 1000 solution takes 2 hours to act well; 2 per cent solution takes half an hour; and over 4 per cent, it is difficult to make, and hence it is not worth trying.

(9) **Lactic acid** has been largely employed, because it is this acid that is normally found in the vagina. When compared with other acids, its action is only moderate and so may be discarded in the light of better means.

Further, a strength of 3 per cent of lactic acid is necessary to be good spermicide, which strength is liable to smart the vagina at least in some people.

(10) **Tannic acid**, 1 in 1000 solution paralyses the sperms. But it is rarely used as it toughens the vagina and decreases its pleasant softness.

(11) **Acetic acid** also does the same in the same strength. This acid may be used in preference to lactic or tannic. Vinegar consists mostly of this acid.

(12) **Soaps** in solution are very good contraceptives. Ordinary kinds usually sting the penis. But cocoanut oil soaps are excellent; they are the most effective and the least harmful among soaps, as they do not contain calcium hydroxide. Almost all the other soaps contain calcium which irritates the tender organs. Soap-foam may be introduced into the vagina before coitus, and thus it will obviate the disadvantages of the douche which can be administered only late. The irritant action of soap may be counteracted by adding egg-albumen to it. Soap-lather may be produced and used, even without the help of the douche-can. In a squatting position the soap solution may be directed upwards into

the vagina and with the hands of the cervix can be cleaned. This is what is generally done by the Japanese and the Chinese. A passage may be quoted from an American book regarding this. "Loosened clothing and a complete squatting posture with strong downward straining bring within reach the external os (cervical opening), and the far pocket of the vagina at the back of the cervix. The patient must experiment beforehand with sufficient persistence to make sure she can recognize the essential anatomical parts when the critical moment comes. She must be familiar with the feel of the mouth of the womb with its dimple or slit and know she can reach into the recesses of the fornix beyond it. The reason she must recognise the external os is in order to give it attention first, with due care to lather its mucous drop; then the pouch at the back of it, and lastly the rest of the elastic walled passage with its creases and tiny folds. To be assured that the patient has learned to pass her fingers in far enough and has recognised her cervix, Dr. H. S. Dixon, health officer in Detroit, has taught 4000 women in the following way. With a sufficiently long bladed speculum, he paints the fornix and external os with a stain, sends the patient into the toilet to lather and after about a minute has the nurse replace her on the table, when examination shows how completely the stain is removed. Thus he verifies her throughness. Against venereal infection, he believes the method particularly effective."

(13) **Dentifrices**. Certain dental creams are very good for this purpose; for example, Neem tooth paste is excellent as a spermicide. It dissolves easily in water and has a good smell. Neem has a peculiarly high quality of being a good spermicide even at very low strengths. An inch length of the cream as it comes from the collapsing tube, dissolved in eight ounces of water, may be douched into the vagina through a glass ear-syringe before and after intercourse. It does not smart, neither does it give any other trouble. Some other dentifrices are also said to be good contraceptives.

(14) **Quinine** and **Chinosol** (a derivative of quinine) are largely used for douches. Nothing less than a 5 percent solution will do to have the necessary effect. Sulphate of quinine does not dissolve well. Bisulphate, hydrochloride, acid hydrochloride and urea hydrochloride, may be used with advantage. But all quinine salts are too costly for ordinary daily use as contraceptives, especially in such a high percentage of strength. Further, quinine is said to be

absorbed through the vaginal mucous membrane and cause poisonous symptoms. It is doubtful how far this is a a fact. I have prescribed the most soluble acid hydrochlor of quinine for several people as a contraceptive to be used per vagina. None of them complained of any poisonous effect, in spite of their using continuously for long periods, but a few of them have found it to be slightly irritating and ineffective. Perhaps it may be due to their improper method of using it. Anyhow, it is not very reliable.

(15) **Lysol.** Watery solution of lysol 1 in 1000 is an excellent spermicide. In stronger solutions, it is dangerous. If lysol is not well mixed with water, it might act on the vaginal wall in concentrated form, and cause serious local damage and consequent danger even to life. Cresol phenol, cyllin, jey-cyllin, are all derivatives of the same drug, and though they are good spermicides, they need not be tried as there are better ones, with little danger.

(16) **Zinc sulphate** solution, though given as a douche for curing leucorrhoea, is not effective as a spermicide in the strength that may be safely used in an ordinary vagina, and hence may be discarded.

(17) **Bichloride of mercury** is an excellent spermicide. Further it is a good

antiseptic and antisyphilitic. But even in very small strengths it might irritate or set up inflammation of the vagina, and so it should not be used for pure contraceptive purposes.

The disadvantages of vaginal douche, as a method of contraception may also be noted here.

(1) After the extreme weariness at the end of coitus, all would wish to be snug in bed for some time. Any delay makes the method ineffective. To get up and apply the douche is rather an unpleasant task and the douche may not be of any use, if not done within two minutes after the sexual union.

(2) To keep the solution warm, is not always easy and a cold douche weakens the nerves.

(3) Some semen might be sucked up by the uterus in certain cases during the act, in which case the douche after the act does not any way help. "There is uncertainity in reliance on the douche, even if it is done instantly after ejaculation, is warm, duly medicated, and the vagina is adequately distended. The several to and fro motions of the glans penis during ejaculation rub sperms into any drop of cervical mucus that may be clinging closely to the external os, or just outside the tiny opening. The douche may not wash away this

mucous, because this is often of a slippery and a tenacious kind. When healthy, it is specifically hospitable to the spermatozoa. The important place of the douche is as an immediate auxillary to other methods."

HONEY.

In some parts of India honey has been largely used from time immemorial for greasing the vagina, the external female sexual organs and the penis. Nowhere is it said that it was used as a contraceptive, but it produced all the effects of a good contraceptive. Honey seems to have been used for many reasons.

1. It acts as a good lubricant and facilitates easy introduction of the male organ.

2. It gives a pleasant smell.

3. In the eastern system of medicine, it is said that constant use of honey over the parts makes the penis large in size and the vagina narrow, and these changes in the relative sizes of the organs increase the pleasure of the parties during coitus.

4. The practice of Fellatic and Cunnilinctus, as the oral stimulation of the private parts by members of the opposite sex is called, is in some parts of the country, enjoyed by the use of honey. The practice may seem to be dis-

gusting, but to those who adopt it, it is a great source of pleasure and prelude to the normal act.

5. If honey is freely used, the sexual intercourse can be enjoyed to the fullest, with the confidence that safety against conception has been ensured.

There are many in India, who use honey always during coitus and it is observed that among such people fertility is particularly low. Whether those who at first introduced honey into the field knew it to be a good contraceptive or not, it is found in practice to be an easy and effective agent. Spermatozoa become paralysed in the presence of honey. Their activity ceases, they cannot wriggle up the cervix and their lives are ended in the vagina itself, if they are not washed out by a douche. The technic of the application of honey is easy. It may be poured into the vagina with the woman on her back, and smeared all over the sides of the vagina by means of a swab. Particular care is to be taken in seeing that the fornices and the cervix are well-smeared. A swab of cotton will be helpful in doing this effectively. If is better to use a long fountainpen-filler in introducing the honey to the mouth of the cervix. With this, it can be effectively applied with the minimum amount of honey.

Two or three filler-fuls may be sufficient, if the same is applied properly to the exact part. Instead of the filler, the vaginal tube supplied with certain patent jellies may be used with advantage.

JELLIES.

Jellies are half-solid preparations, made of some drugs with the help of some vehicle like glycerine, gum, treacle etc. Several kinds of contraceptive jellies are put in the market. They are sold in collapsible tubes with screw-caps just like the tooth pastes. In some varieties, a sort of nozzle is also provided with each tube. The screw-cap may be removed and the nozzle screwed on to the mouth of the collapsible tube. The nozzle is about five inches long and if pushed into the vagina will reach the cervix. It is used just as Hadensa or Donovene are used in piles, and is very handy, of an easy technic and can be used by any woman. The price alone prohibits its purchase. There has been a marked increase in the production of these and many of them are introduced to the public without mentioning their composition. But, it is sure that most of them contain only lactic acid and chinosol. With these failures are more than was expected.

Great care is to be taken in the selection of the particular kind of jelly. The vehicle should be easily soluble and the chemical quickly dis-engaged to act on the sperm.

Dr. Stones' jelly is 5 per cent boric acid. This strength is enough to kill sperms. K. V. Jelly is 4 per cent boric, and is a bit weak. Koromex is latic acid jelly and is described to be used with an occlusive pessary. Dr. Dickinson is of opinion that lactic acid jellies should be over 2 per cent strength to be effective, and above that strength it might smart, like many other jellies. Alum jelly is the best, cheapest and the most effective. Anybody can prepare it at home by mixing together in the following proportion.

Alum.................drams two.
Starch..............drams two.
Glycerine.........Ounces ten.

(Equal quantities of alum and starch in 40 times the quantity of glycerine). Any chemist will prepare this at a small price.

Spetonex and **Patentex** are two patent jellies made of alum and may be recommended. But with one-fifth of the cost of these patent drugs, one can prepare the same quantity, which will be also fresher in quality.

Metaphen is a powder which is made

into a jelly with starch and glycerine. It acts very quickly on spermatozoa, even in a dilution of 1 in 80000 and is equal to bichloride of mercury in its spermicidal power. As a contraceptive it is only being tried and no definite opinion can be given at present about its effects on the vaginal mucous membrane.

Hexyl Resorcinol is another new preparation which is being tried as a contraceptive. It has a low surface tension and acts very well, regardless of acidity or alkalinity. It is sold in the form of jelly.

Neem oil is prepared out of the seeds of of a particular tree called Neem, which grows largely in several parts of India.

From a long time, Indians have been using this oil as a medicine for various diseases. It is a very strong antiseptic, slightly astringent, a local stimulant, and a good spermicide. As it has an unpleasant odour, it is scented before its use. The astringency is diminished by diluting the strength.

It may be prepared as follows:—

Take some pure neem oil and boil it for some time. Keep for a day or two, mixed with some pure powdered charcoal, animal charcoal or that of the cocoanut-shell would be the best. Then decant or filter it and add some camphor dissolved in rectified spirit. Mix well and keep in a warm place or hot sun, so that the spirit may be evaporated off. The residue may be used as a good contraceptive.

It is available in the prepared form, but it is cheap and better to be prepared at home. It is used just like honey, either by swabbing the vagina and the cervix just before coitus, or by dipping a sponge, cotton, or wool tampon in the oil and introducing it into the vagina as has been already described.

The advantages of the camphorated neem oil are:—

(1) It is cheap.
(2) It is agreeable to the parties.
(3) It acts as a lubricant to the vagina.
(4) It is a sure contraceptive.
(5) It is antivenereal and antiseptic.
(6) It has a pleasant odour.
(7) It is a good blood-tonic and there is chance of its being absorbed through the vaginal mucous membrane as well as the skin of the penis.

Gleitofix, consists of a thick paste in which are incorporated substances which act as prophylactic and germ-killing. Besides the action of these substances in destroying the male sperms, the thick paste acts as a layer covering the opening of the womb, whereby any penetration of the spermatozoa into the womb is mechanically checked. Gleitofix is said to act both chemically and mechanically. The effect of this also has not been personally experimented.

Mil-San, a scientific contraceptive, is said to be non-poisonous, non-greasy, non-staining, hygeinic and antiseptic. "It is a balanced compound of nine ingredients of such viscosity, that while sufficient adherence to the parties and mucous membrane is assured, it spreads over the whole surface of the vagina and fornices. It mixes readily with the vaginal and uterine secretions and penetrates deeply into the cervical canal ensuring effective and immediate spermicidal action."

There are several other jellies of which Proseldis and Contraceptelene may be mentioned as being largely advertised and used by many with a certain amount of success.

All the jellies have the disadvantage of forming a covering to the cervical end of the uterus, and thus preventing the direct fall of the semen on to the cervix during coitus, which is essential in several women to consummate the ogasm in themselves.

SOLIDS.

The use of solids as contraceptives is to be deprecated, because most of them take time to dissolve in the vagina and unless they are in liquid form, they cannot act on the spermatozoa. Several drugs in the form of tablets, cones etc., have been prepared by various commercial agencies and put in to the market. Almost all of them are labelled "The best contraceptive", which the makers themselves do not believe. It is high time that ~~that~~ the authorities interfere and prevent the fraudulent way in which the manufacturers of such drugs dupe the people. We shall discuss the merits and demerits of some of these. All these are classified as pessaries.

Boric acid. It is a very common drug that has been marketed in various forms for contraceptive purposes. It is a weak antiseptic and a still weaker spermicide in the strength that will dissolve in any media that can be introduced into the vagina. As powder, if blown into the vagina, it is worse than useless.

"Boro-glyceride gelatine suppository of Wyeth is three per cent Boric, Brocker's suppository is 15 percent Boric, Maxwell's suppository is seventeen percent Boric". To extol the patent drugs is not the function of the medical man, and as such, the less said about them the better.

Alum. More than once it has been said, that alum is one of the best of contraceptives. Many of the patent contraceptive tablets contain alum, Antibion and Finil are foam-tablets containing alum. Speton contains alum and it is ten tims more active than quinine. These are sold largely and may be said to be fairly effective.

Quinine, in the form of tablets or cones, is largely sold as a contraceptive. It is combined with coco-butter and made into convenient forms. Rendall's "Wife's friend" and Lambert's "Lam-butts". are made of quinine and coco-butter. Docker's "contraps" contain a small quantity of lactic acid as well.

Dr. Eardley Holland, obstetrical and gynecological surgeon to the London Hospital, opines, that quinine acts as an irritant to the vagina in some and that he has seen a few cases of mild vaginitis, which he ascribed to this cause, chiefly because it quickly subsided when the use of quinine was discontinued. But it may be stated that I have made several people use quinine hydrochlor and the acid hydrochlor in the form of powder (a pinch of which was directed to be put into the vagina before each coitus) for long periods and none of them complaind of any irritant action. The effect of quinine on the vaginal mucous membrane of dogs, rabbits and certain other animals was tried experimentally over varying periods of time. But the results were all negative, no pathological effects being found.

A mixture of quinine and urea hydrochlor are largely sold as contraceptives. They are spoken of by their manufacturers as good spermicides. Dr. Baker is of opinion that they only paralyse the spermatozoa. Recently, I saw an opinion in an English publication, that quinine and urea tablets produce marked vaginitis on continuous use and sometimes inflammation of the uterine mucosa even on a single administration. •

Foam producing pessaries. These when introduced into the vagina, undergo chemical change, effervesce violently, and produce certain gases which kill the spermatozoa. The foam fills the deep part of the vagina forming a barrier to the cervical opening as well. They are to be placed 3 or 4 minutes before the sexual act into the deepest portion of the vagina; in the woman who has a dry vagina it is to be dipped in warm water before use. The tubes containing the pessaries themselves are to be kept in dry places, lest they should be spoiled by dampness. The most commonly known foam-producing tablets are, Semori, Bircon, Contrafant, Speton, Bymeston, and Proseldis.

Speton evolve oxygen at the body temperature. Bymeston produce hydrogen peroxide gas which is inimical to all germs and such other living organisms. Proseldis evolve a gas which coagulates semen on contact with it, and thus disables spermatozoa. Semori is a German preparation which is largely used in England. It is said that, even at 1/10 of the concentration at which it is normally used, it kills every sperm in half an hour. Bircon has been tried on several people here and found effective, though, like all other foam-producing tablets, it produces slight discomfort to the woman. Contrafant tablets also produce oxygen with moisture and I cannot say how far it is effective in as much as it has not been tried here.

No chemical contraceptive is perfect. The attention of many research workers in the west is now-a-days turned towards finding out a suitable, cent per cent effective, harmless and at the same time cheap contraceptive. The tabloid and the cone-form are the easiest for use. Some of the women, however, on whom these tabloids were tried, complained of discomfort, a few of slight smarting, while among a few, failures in effect have been reported.

The effect of the several chemical contraceptives on spermatozoa was found out by Dr. J. R. Baker. A part of his report which appeared in the *Journal of Hygiene* may be quoted.

Names of drugs.	Percentage of effect, up to
Hexyl resorcinol.	1/64 per cent soln.
Iodine.	1/64 ,, ,,
Acetic acid.	1/32 ,, ,,
Lactic acid.	1/16 ,, ,,
Potassium permanganate	1/16 ,, ,,
Citric acid.	1/4 ,, ,,
Quinine and urea.	1/4 ,, ,,
Cresol.	1/4 ,, ,,
Quinine hydrochlor.	1/2 ,, ,,
Quinine bisulphate.	1/2 ,, ,,
Boric acid.	3 ,, ,,

He found that the patent drugs Semori Finil, Speton, Monsol, etc., are cent per cent effective.

CHAPTER IX.

X-ray and Irradiation.

X-ray and Irradiation have been advanced in the treatment of various chronic and irrecoverable diseases, with great success. Research is still being conducted in all directions, regarding the action of these agencies. Early stages of cancer are said to be completely cured. Radium has given marked improvement in the treatment of enlarged glands, internal as well as external.

Recently it has been shown that X-ray acts on the functions of many of the glandular structures such as the spleen, the liver, and the ovaries. In the ovary, a temporary arrest of ovulation is produced. Research is still being conducted in this line, regarding the finding of the most suitable methods of administration, the proper dosage and prognosis. Nothing definite has been determined about the details of administration. How long the effect would remain is still a mystery.

Contraceptive treatment by this method on a person who is already pregnant produces a chance of the foetus developing into a defective or abnormal one. To prevent this malformation of development, either one must absolutely be sure of not being pregnant, or a complete evacuation of the uterus by curretting must be done before exposure.

X-ray therapy seems to diminish or destroy sex feeling in a few people, which may be due to indiscriminate application. This defect in treatment would be rectified in course of time by proper graduation of the voltage

A few people seem to get severe disturbances of menopause after this treatment. The great disadvantage of this method is that it is not possible for everybody to get it done. A few of the rich may be able, but 99 per cent will have to be satisfied with other methods. But we can expect that within a few years this method of sterilization may become cheap and universal.

"The special field by arrest of ovulation by x–ray or radium is with patient with uterine bleeding adopted to this treatment, such as those over 35 years of age, and with chronic metritis, uterine arteriosclerosis, or small fibroids that are not submucous."

A passage may be quoted from the ***Practitioner*** of July 1933, written by the radiologist of the French Hospital London, F. Hernaman Johnson M. D, D. M. R. E.

"The modern treatment causes no anxiety to the radiologist, and should cause none to the patient or her doctor. It has been ascertained that 30 percent of the amount of X-rays necessary to cause skin reaction is sufficient to produce the required effect on the ovaries of a woman. With the high voltage apparatus now available 20 to 30 per cent of the energy falling on the skin reaches the ovary in a patient of average size. It is possible to sterilise an ovary with a single dose of penetrating X-rays with only temporary damage to the skin. In practise, however, we wish to avoid even temporary upset. I use two fields for each ovary anterior and posterior. The amount of radiation falling on the skin is one-half of that required to produce an erythema. The two sides are done on consecutive days, and a month later the treatment is repeated, with slight modifications. Having used this technic for several years, I have never seen the slightest change in the skin, or any constitutional upset worth speaking of".

CHAPTER X.

Most Modern Methods.

HORMONE THERAPY.

The active bodies in the internal secretions of the different glandular structures in the body are called hormones. It is made out that these hormones play an important part in running the different wheels of the cycle of life. Each system in the body has separate set of glands, and the working of each of these systems are interdependant on the hormones of the glandular structures of the other systems. Hence the hormones of the pituitary and the thyroid glands have much to do with the sexual cycle as the hormones of the sexual glands themselves. Extensive research is being conducted in Germany, America and England to find out as to how much the functions of the sexual glands are dependent on the hormones of the other glands. It has been discovered that: "The first ovulation at puberty is brought about by the influence of the maturity-inducing factor of the pituitary gland.

Succeeding ovulations are presumably due to the full ripening of a growing follicle, but appear to be likewise influenced by the hormone of the pituitary. However, no periodicity of the pituitary secretion has yet been shown. Too great an action of the anterior pituitary lobe produces an immobile condition, or a static condition in the ovary, showing itself by excessive luteinization of these follicles which do not rupture and the centre of which a degenerating ovum can be noted. It is as yet too early to state whether this anterior lobe action can be utilized to prevent conception or produce sterility. It has been determined that such luteinization bring about a cessation of the menses in the human female, the uterus remaining in a state of premenstrual excitation."

Inactivity of the genital gland may be produced by hyperfunction of the Thyroid and Adrenaline glands; but as it might seriously interfere with the working of the other systems, artificial hyperfunction cannot be brought about by administering the extracts of these glands, without damaging the working of the whole human system. Certain German doctors are expecting to produce some hormone preparation which may be effectively administered by mouth. When such a thing comes to the market, it might supercede all the other methods of contraception.

There are still other Hormones by means of which pregnancy may be arrested It has already been said in chapter III, that the Hormone of the corpus luteum cells helps the nidation of the impregnated ovum to the uterine wall. This particular hormone is called Progestin. There is another hormone produced by the Graffian follicles, which is called Oestrin. The function of this seems to be that of putting the uterus in the proper physiological condition, i. e. in producing menses and liberating fresh ova. Thus oestrin and progestin, though antagonistic to each other in their effects, are synergistic, i. e. by combined action they can produce an effect which neither can effect separately. It is surmised that injections of oestrin must prevent the nidation of the fertilised ovum and thus cause abortion in pregnant women. At the same time progestin injections must prolong the term of pregnancy and cause premature death of the foetus. Hence it is clear that these two hormones may be effectively used in controlling births.

Oestrin (also called oestrus-producing hormone) is largely found in the urine of pregnant women. It has been isolated in two forms of crystals. Investigations are being done in several places to find out a common standard of units in terms of its action on animals. The standard adopted by the Conference held in London under the auspices of the Health Organisation of the League of Nations is preserved at the National Institute for Medical Research in London, and can be obtained from them, for those who care to experiment

Immunisation.

All know that one who is affected by smallpox gets immunity to smallpox for a long time, if not for ever. Similarly one gets immunity in many other diseases as well; there is only the difference in the period of time during which the immunity lasts. What is this immunity? How is it produced? These are natural questions which any scientific mind would care to inquire.

Immunity shall be explained by taking a concrete example. In blood there are certain solid cellular bodies called white corpuscles, together with the innumerable red corpuscles that give the red colour to the blood. The function of the white corpuscles is to fight the battle of life. They fight against all the extraneous elements that get access to any part of the system. When a man is attacked by smallpox, a regular fight ensues between the smallpox germs that enter the body and the white blood corpuscles existing in the body. The disease-germs increase in number by division of each germ into millions. They produce plenty of poisons (toxins) which are inimical to the soldiers (white blood corpuscles) in the blood. The latter, in turn, increase in number and try to swallow the disease-germs. ' During the fight a particular kind of antitoxins are produced in the body to withstand the effect of the toxins of the germs. In the end, if the germs win the battle, the person dies; but if the white corpuscles win the germs are completely subdued and their toxins neutralised by the antitoxins produced in the body, and the person survives the disease. The antitoxins produced will be much more than what would have been necessary for the occasion. These remain in the blood ready to fight with the toxins produced on a succeeding invasion by the army of the same kind of germs. Hence a second invasion will be more easily subdued by those antitoxins and the disease will not be developed at all, another time. This is how one gets freedom from the particular disease after one attack of it, and then he is said to be immune to the disease. Antitoxins are specific to specific diseases. They are produced in all infectious diseases and their effects last for a varied time in various diseases.

Antitoxins naturally produced in a person (as described above) who is affected by smallpox remain effective for ten or fifteen years in the human body, but that of cholera or plague lasts only for about six months or one year. Antitoxins can be artificially prepared by injecting the germs of each disease into a living being; say horse or cow, and then collecting the antitoxins produced in them. Such collection of antitoxins is what is called a vaccine or serum, which is largely used for the prevention of diseases. Plague-serum is prepared by injecting plague germs into the horse. The horse gets a mild attack of plague. After the horse is cured of plague, its blood-serum is collected and labelled as plague-serum. When this is injected into a man, he gets artificial immunity to plague.

Recent research has shown that if the seminal fluid of the male is injected into the female of the same species, the blood of the latter produces an antitoxin to the sperm which inhibits the production of ova in them. This fact has been experimentally proved.

The semen absorbed through the vaginal mucous membrane might produce the same kind of antibodies, to some extent. But the quantity absorbed may be very little in ordinary women who get the opportunity of such absorption only once or twice a week. But it is noted, that those females who are used to sexual excess have a particularly low fertility. This fact is seen in various races and classes of people. The ordinary prostitute seldom become pregnant, in spite of her not adopting any contraceptive means.

The rates of the natural increase of the population and the fertility in the different communities in Travancore & Cochin have been carefully studied with this view, from the census reports of 1931. It is seen that polyandrous, polygamous and people of loose morals are the least fertile, while those who adhere to strict moral principles and follow purdah system are invariably more fertile.

Travancore.	Rate of increase of population during		Average No. of children per family.	× Fertility rate.
	1921 to '31.	'01 to '31.		
State average.	27·2.	60·2.	6·5.	200
Hindus major portion of which consists of polyandrous and polygamous communities.	23·0.	54·8.	6·3.	197.
Konkanis, which includes Devadasis.	5·3.	22·5.	*	*
Tribes which includes polyandrous Mannans, Pallians, etc.	21·0.	*	*	*
Christians, the major portion of which forms the Syrians.	36·8.	130·1.	7·0.	206.
Moslems whose women follow purdah system.	30·6.	85·4.	6·2.	205.
Cochin.				
State average.	23·1.	40·0.	3·8.	195.

Cochin. *Cont.*

	Rate of increase of population during		Average No. of children per family.	× Fertility rate.
	'21 to '31.	'01 to '31.		
Hindus, major portion of which includes polyandrous and polygamous communities.	20·7.	33·3.	3·7.	189.
Konkanis which includes Devadasis.	19·6.	31·9.	*	*
Kadars of the Tribes who are of loose morals, as per opinion of the census commissioner.	2·3.	*	*	*
Christians, major portion of which consist of the Syrians.	27·9.	59·5	3·9.	210.
Mosalims whose women follow purdah system.	27·9.	52·7.	4·1.	193.

* These figures could not be ascertained from the census reports.

× Fertility rate is the proportion of children under 10 years to 100 females between the ages of 15 and 45.

The figures given in the table given above speak for themselves. There might be individual variations in all communities. Sufficient reasons for the general variation in many of the communities that live under the same conditions and environments have not been given in the census reports, except for the low rate of increase among Bramhins and such other communities who are pure vegetarians and who have no widow marriage, in spite of their having child and infant marriages. Conversion to Christanity and Mahamadanism may be a chief cause of the high rate of increase among them. But, in spite of leaving a correct margin for the conversions, the rate of increase of the Christians and Mahamadans seem to stand high. The Travancore census report regarding this point may be quoted. "Large increase of Christians is mainly due to conversions and high fertility. Had it not been for the conversions their increase would have been only 28·3 per cent. Conversions to Islam is rare. But the high rate of Muslims is inexplicable." The Syrians who form the major portion of the Christians and the Mahamadans whose women mostly follow purdah system, are morally strong and are more fertile than all the other communities living amidst them with almost the same natural environments.

There are some people who are used to internal administration of the semen, and it is found that in them the rate of fertility is particularly low. This also explains the theory stated above. It may be supposed that the semen is absorbed in them in large quantities through their alimentary canal and antibodies are produced which effect an inhibition of the production of ova in them. An investigation among the different classes and races among prostitutes also will enlighten on the subject.

Though nothing definite can be said at present regarding the best method of administration, dosage, reaction, prognosis and the range of effect of immunisation by semen, it has been made clear that a certain amount of sterility can be produced by the injection of semen into the female. It may be given intramuscularly and all those doctors who have a research tendency are requested to do this experiment and collect facts obtained thereby.

I have done experimental injections of semen on several persons. Fresh semen was collected by means of coitus interruptus, in sterile bottles, from those who are sure to be free from all infectious diseases. The specimens having been kept closed and warm, was injected 6 to 12 hours after collection, when the spermatozoa would be still motile and the composition unchanged, into the biceps muscles. Three injections were given to each at an interval of one week.

Dosage.

1st Injection............1 c. c.
2nd Injection............1½ c. c.
3rd Injection............2 c. c.

In most of the cases, a reaction was noted. One woman got severe shivering within five minutes after the injection on all three occasions, each time lasting for about fifteen minutes. There was slight headache and an appreciable rise of temperature in many. The normal swelling that occurred at the site of injection cleared up in three to four days. There was no suppuration in any. The effects of the administration may be summed up as follows:—

1. In all the persons sexual vigour and strength seem to have been increased.

2. Menstruation was delayed and often scanty in all, with less of pain and uneasiness in those who had pain and considerable discomfort formerly.

3. None of them is known to have become pregnant after the injection, the first case having been treated only 2½ years ago.

4. In one case prolapse of the uterus occurred six months after the injection. But this

may be on account of the instrumental delivery she had about three months before the treatment.

In view of the above facts it may be safely concluded that this method is one of the best means of spacing pregnancies. In as much as it is still undetermined as to how long the immunity would last, I cannot definitely say how far it would be effective.

Polygamy affects fertility. It has already been explained that one who is used to sexual excess will have less number of fertile spermatozoa in his semen. Polygamous men will have naturally less sexual rest than monogamous men, and polyandrous communities are polygamous as well. This might be one of the causes of the low fertility in such people.

Heating the testes.

Investigation on the sensitiveness of the germinal ephithelium of the testis to temperature has been carried out by several people. Prof. Carl of the university of Chicago is one among the pioneers of this experiment. It has already been said that the undescended testicle that remains in the abdomen or inguinal region is functionless. Similarly, if a testis that is in the scrotum is operated upon and placed in the abdomen, it ceases to produce spermatozoa. This change is supposed to be caused by the slight difference in temperature between the scrotum and the abdominal cavity. This fact lead scientists to find out the effect of artificial heat on the testicles and it has been found that keeping the scrotum of certain animals in hot water for some time, brought about degeneration of the germinal epithelium in the testicles. The spermatozoa and their original cells became destroyed. The sperm in the epididymus is seen to be very resistant. Further, heating the scrotum cannot affect the stored semen in the seminal vesicles. Hence it takes some time, say a week or two, before the effect of the heating can be of use in the prevention of conception.

The results of the several investigations conducted on this point in America may be summed up as follows:--

When water at a temperature of 46 degrees centigrade is run over the scrotum for about 30 to 45 minutes, the degeneration and disquamation of the spermatogenetic cells were noted and it was found that the matings of these animals became sterile after a few days, i. e. after the stored up semen in the seminal vesicles and the epididymus is spent. The peak of sterile matings is reached between the 45th & 75th days after the experiment. One good feature that was noted is that "At no time was there any effect on the sexual vigour of any male".

I asked eight people during the early part of 1933, (leaving all those who have begun later), to try this method; of which one having left this place could not be traced, another discontinued following my directions on account of indifference or faithlessness in the effect. The remaining six who followed my instructions as practically as could be possible for them, seem to have been successful in their aim. They were asked to keep the scrotum in water which was as bearably hot as possible for about half to three quarters of an hour. The water was to be changed several times in order to maintain the heat constant. This process had to be done once a day, continuously for three days and to be repeated once in three months. None of them could do this with the scientific correctness of the time demanded and the temperature necessary But as far as it could be done with the rough idea of time and heat, I am of opinion that the results are very encouraging. None of their wives became pregnant after they began to try this process, in spite of their having sexual union two to four times a week, and in spite of the fact that the wives of all of them were regularly adding to their families with an average spacing of less than two years. In this connection, I might confess that I was not able to examine the semen of these people under microscope to note whether there are any living spermatozoa in the specimens. Several more are now trying this method as per my instructions, and in the next edition of this book, I think it would be possible to give better statistics based on more scientific work.

Dr. Dickinson says "If heat to the testicles can be shown to be harmless and effective, of considerable duration and reasonable in its results, its utility will be very far-reaching because of the simplicity and universal applicability of such a method. The poorest man in the remotest land could use it. To China, Japan and India it would be a boon". I wonder how he forgot the millions of unemployed starving people in his own country and such other people of the west, who seem to patronise largely even the most difficult and nasty methods of prevention of conception.

In these days of increasing unemployment› the brunt of money depression and bankruptcy are most felt in America, though Dr. Dickinson thinks that poverty strikes more in India, China and Japan. The following is a passage from *The Hindu* Dated 4th April 1933, about the state of affairs in America as is vigorously described in one of her own papers.

"Ships are tied up in harbours and their hulls are rotting; freight-trains are idle; passenger cars empty; 11,000,000 people are without work; business is at stand-still; the treasury building is bursting with gold, yet Congress wrestles with a deficit mounting into the billions, the result of wild and extravagant spending; granaries are overflowing with wheat and corn: cotton is a drug on the market; food crops are gigantic and unsaleable, yet millions beg for food; mines are shut down; oil industries are engaged in cut-throat competition; farmers are desperate, taking law into their own hands to prevent foreclosures; factories are idle; industry is paralyzed; 2,000,000 to 300,000 beardless boys are drifting aimlessly along the highways; and active smoke-stack is a curiosity." No wonder that the Americans struggle hardest in popularising birth control methods among themselves.

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CHAPTER XI.

Interruption of Pregnancy.

Well! Doctor, suppose pregnancy occurs in spite of our following your suggestions regarding the prevention of conception, what should be done?". This is a common query by many couples to their advisors. For a long time I have been evading such questions. Closer study of the social condition of the general mass, and mature consideration as regards their health, make me think that 75 percent of those who ask such questions should be answered that such pregnancies may be interrupted. Many might damn it as homicide, but really it will be only "A little harm done to a great good end". Neither does the law prevent it, when it is the question of saving the mother's life.

Interruption of pregnancy is causing abortion, and it is considered a crime. "Criminal abortion or causing miscarriage is unlawful expulsion of the foetus. The term miscarriage used in law, includes both abortion and premature labour. Medical men, however, restrict the term premature labour to denote premature expulsion of the child that has attained viability, and use the term abortion or miscarriage to signify expulsion of an ovum or foetus at an earlier period". Indian penal code regarding criminal abortion is put under four sections, which are as follows.

312. "Whoever voluntarily causes a woman with child to miscarriage shall if such miscarriage be not caused in good faith for the purpose of saving the life of the woman, be punished with imprisonment of either description for a term which may be extended to three years, or with fine, or with both; and if the woman be quick with child, shall be punished with imprisonment of either description for a term which may extend to seven years, and shall also be liable to fine.

Explanation:— A woman who causes herself to miscarry is within the meaning of this section.

313. "Whoever commits the offence defined in the last preceding section without the consent of the woman, whether the woman is quick with the child or not, shall be punished with transportation for life, or with imprisonment of either description which may extend to ten years and shall also be liable to fine.

314. "Whoever with intent to cause the miscarriage of a woman with child, does any act which causes the death of such woman, shall be

punished with imprisonment of either description for a term which may extend to ten years, and shall also be liable to fine; and if the act is to be done without the consent of the woman, shall be punished with transportation for life or with the punishment above mentioned.

Explanation:— It is not essential to this offence that the offender should know that the act is likely to cause death. (Unlike in English law the question here arises of the consent of the woman). Two other sections of the code refer to results which may arise to the child from the doing of certain acts before its birth.

316. "Whoever does any act under such circumstances that, if he thereby caused death, he would be guilty of culpable homicide, and does by such act cause the death of a quick unborn child, shall be punished with imprisonment of either description for a term which may extent to ten years and shall also be liable to fine."

The English law as regards this is as follows.

"Every woman being with child who, with intent to procure her own miscarriage, shall unlawfully administer herself any poison or other noxious thing, or shall unlawfully use any instrument or other means whatsoever, with like intent and whatsoever, with intent to procure the miscarriage of any woman, whether she be or be not with child, shall unlawfully administer etc, shall be guilty of felony.

"Who-so-ever shall unlawfully supply or procure any poison or other noxious thing, or any instrument or thing whatsoever, knowing that the same is intended to be unlawfully used or employed with intent to procure the miscarriage of any woman, whether she be or be not with child, shall be guilty of misdemeanor, and being convicted thereof, shall be liable, at the discretion of the court, to be kept in penal servitude for the term of three years, or to be imprisoned for any term not exceeding two years.

"N. B. — The minimum term of penal servitude awardable is increased to five years. It may be noted that under these sections (1) the question of pregnancy only arises when a woman is accused of doing act with intent to procure her own miscarriage; (2) that the question of quickening does not arise at all, and (3) that these sections do not, like those of Indian code, expressly provide that the absence of the woman's consent aggravates the offence. Further, in England if the death of the woman results, the ordinary law of homicide applies, the felony is considered to be murder".

Abortion may be accidental, justifiable, or criminal of which we are concerned here only with the justifiable variety.

Interruption of pregnancy is justifiable in cases where such interruption will help to save the life of the mother, i. e. when there is risk of the mother's life if the pregnancy is permitted to continue. It is the bounden duty of every doctor to see that his patient is timely warned of the danger of continuing the term of pregnancy and is helped to get the foetus out, when he clearly sees that her life is joepardised. There are various indications which warrant him to induce abortion.

(1) **Tuberculosis**. A Tuberculous woman is unfit to be a mother and when her doctor sees that her lungs or part of her lungs are affected by this disease, and that she is pregnant, he will be justified in the interruption of such pregnancy. It arrests the course of tuberculosis It is found that in those pregnant women, with one apex of the lung is affected, 87 percent got complete arrest of the disease after induced abortion. In those with both apices of the lungs affected, about 50 per cent got tuberculosis arrested after abortion, and 25 per cent of those with fairly advanced P. T. got the disease arrested after abortion. George Winter in Hallen is of opinion

that loss of weight and coughing out blood to a moderate degree do not indicate interruption of pregnancy; but continuous fever and a positive microscopical examination are both sufficient indications for immediate interference. But this is only a matter of opinion. Tuberculosis of other parts than that of the lungs also increases in severity with pregnancy, but seldom it is so serious as to cause danger to the mother's life.

(2) **Heart diseases**. Marriage and sexual union shorten the life of a person having diseases of the heart. The excitement during intercourse and all other emotional disturbances connected with it, tell much upon the regular working of the heart. Pregnancy and its attendant strain add still further to weaken this important organ.

If the doctor suspects failure of the heart, acute dilatation, or other compensatory disturbances in a pregnant woman, especially when she does not react to rest and digitalis, the pregnancy should be interrupted at the earliest opportunity and herself immunised from further pregnancies.

(3) **Diseases of the liver.** Attack of jaundice is a grave symptom in pregnancy. Yellow tint in the eyes and throughout the skin, with yellow coloured urine denotes some disease of the liver, and pregnancy aggravates this

condition. If not interrupted early, it becomes fatal in most cases, and hence the doctor should be dutiful to be alive to the emergency regarding the interruption of pregnancy in such people.

(4) **Diseases of the kidney.** The chief symptoms of the diseases of the kidney are, swelling all over the body with scanty urine containing plenty of albumen, loss of appetite, headache, etc. When all these occur in a pregnant woman, the prognosis is bad. These symptoms often lead to eclampsia and uraemia, both of which are very serious and often fatal. Early induction of labour is the treatment in such cases.

(5) **Diseases of the brain.** There are several diseases of the nervous system, which are aggravated during pregnancy and cause death to the mother. Acute ascending paralysis which affects the bones, back, muscles of the neck and chest, certain neuritis, all these need early evacuation, lest they might increase in severity. Mental aberrations such as dementia praecox, psychoses etc. also get immensely worse during pregnancy, which, if not terminated early might make them commit suicide. In all these cases the doctor is justified in aborting.

(6) **Uterine diseases.** There are certain diseases and malformations of the uterus

which might make pregnancy terminate fatally if permitted to continue to full term.

(a) If the ovum is implanted in the uterus in such a position that the plancenta is formed at or near the internal os (cervico-uterine opening), which condition is called plancenta praevia, there is a chance of severe bleeding occurring, causing ultimate danger to the mother. When this condition is diagnosed, it would be criminal if the doctor does not interrupt the pregnancy early enough to save the mother.

(b) Even if bleeding occurs from other causes, early induction of labour may be effected with justice if the haemorrhage cannot be stopped by other means.

(c) In certain cases of uterine tumours complicated by pregnancy a continuance to full term will be often dangerous to the mother.

(d) In certain displacements of the uterus, when it may not be able to expand to contain a full grown babe, as in adherent retroversion, where rupture of the uterus is possible, early interruption may be necessary to prevent danger.

7. **Diseases of the pelvis.** In contracted pelvis, as is often found in dwarfs and other deformed people, a normal delivery of a full grown foetus is impossible. Caesarean section and deli-

very of the child is the only possible way and this cannot safely be done several times in the same person. If let alone, rupture of the uterus and sudden death is sure to occur. Tumours of the pelvis which would narrow the outlet of the pelvis, also prevent normal delivery and cause rupture of utreus, if let alone. In these cases, if caesarean section cannot possibly be done, early interruption is the best treatment.

(8) Toxaemias of pregnency.

In some people certain toxins are developed out of the placenta and the foetus, which produce very severe symptoms of morning sickness. An aversion to food and incessant vomiting with extreme weakness and prostration form a syndrome which is called Hyperemesis gravidorum. It occurs usually in the early months of pregnancy, and when it resits all treatment, evacuation must be effected which will suddenly bring about cure. Eclampsia is another toxaemia of pregnancy which consists of repeated fits and unconsciousness. It often leads to death, unless early attended to. When averse to treatment interruption of pregnancy is essential to effect recovery.

(9) Anaemias.

Severe anaemias such as the perinicious variety and the so called spleenomedullary leukaemia, when complicated with pregnancy indicate early induction of abortion.

(10) **Diabetes** (mellitus).

In this disease the power of digesting the carbohydrates is diminished or lost, which is more or less passed in the urine of the person in the form of sugar. Increase in the quantity of urine containing sugar, severe thirst, voracious appetite steady loss of weight and extreme weakness, are the chief symytoms of this disease. Though treatment is not very effective in diabetes, complication of pregnancy is not often dangerous; and unless coma, threatens, or if proper diet and treatment does not reduce the quantity of sugar passed in the urine, it would not be justifiable to induce early labour.

(11) **Rape.**

Pregnancy after rape, without the consent of the woman is a sufficient cause for interruption.

(12) **Rare diseases.**

There are several rare diseases such as goitre, optic neuritis, ottosclerosis, appenicitis, etc, which when accompanied by pregnancy need interruption in the interest of the mother.

(13) **Social causes.**

Opinions are varied regarding the advisability of inducing abortion in people who might produce children that might turn out to be a bugbear to society. People possessing the so-called incurable inherited diseases such as mental deficiency, mental derangement, leprosy, etc. might produce children with such diseases. It is better that such people are not given opportunities for reproduction, by prohibiting marriage by law, or teaching them the best methods of prevention of conception. How far interruption of pregnancy is justifiable is a matter of opinion. Even if the birth of such children is limited, there is no possibility of eliminating these diseases, in as much as induction of abortion will not be possible and advisable in all. Hence the better way would be, to teach them the methods of prevention of conception or sterilise and permit them the pleasures of sex.

(14) Illegitimacy.

Induction of abortion is more among those unmarried women and young widows who become pregnant. Several •complications followed by death are reported on account of professional quack abortionists handling such cases. For privacy and easy availability with money, such people are approached. They abort in the most unscientific manner and not seldom cause danger. Such criminal abortions are not rarely done in most of the big towns all over the world.

Mr. B. V. Jadhav, M. L. A. of Bombay is introducing a bill in the Imperial Legislative Assembly in India in order to get abortion legalised. The details of the bill are not available. But still it is expected that there will be oppostion from several sources. In Russia, by such legalisation the mortality among women has been reduced. The death due to abortion was about 20 per cent formerly, but after this act was passed, it has come down to 9 per cent. Regarding legalisation of abortion, a venerable lady recently wrote in the *Hitavada* of Nagpur as follows:—"Let us cast aside all lay fears and give a chance of decent life to the women and apparently young girls who have been cornered into ignominy. There is no actual murder in an abortion within three months of pregnancy and even if there be, emotionally, it will not be more heinous a crime than forcing the ignorant girl into a most disagreeble marriage with the very seducer, or turning her into an outcaste all her life."

(15) **Poverty.**

Incapacity to provide for the children, is often a cause of preventing continuation of pregnancy. The law does not permit it in any part of the world, neither will it be done by any respectable doctor for this reason. There are a few who are of opinion that the law by which such abortion is made criminal, is something like the municipal rule, including urination in public places a cause for prosecution without providing urinals in any part of the municipal area. As such, they hold that either the law should be amended, or birth control centres should be opened, where people may be taught as to how they can prevent indiscriminate production of children.

Time for abortion.

The earlier the better. Once you decide to do it, let it be done as early as possible. The more it is delayed the greater the chance of complications.

Very many abortions are being done between the third and fifth months of pregnancy. Most people get sure of the condition only by the third month. It is not seldom that severe bleeding, sepsis, and other complications attend or follow such abortions, being mostly conducted clandestinely by untrained hands. A doctor does it if he feels it his duty, during the second month of pregnancy. There will be the least bleeding, the least pain, and the least cause for complication. In the Moscow abortarium in Russia, which contains about three hundred beds, abortion is usually induced one week before the second missing period, i. e, the seventh week after the last period.

Methods of interruption.

Various methods of inducing abortion are described in medical books, and as such there is no necessity to review them here. But, the great difference between the scientific methods and the quack's crude means shall be summarised.

The quack abortionist effects his art in several ways.

(1) He adminsters **certain drugs orally,** which produce contractions of the uterine muscles, which eventually expel the foetus. Proper dosage is an important factor in the administration of these drugs, and an expert alone can do it correctly. Usually, either the drug will be too small to effect the necessary action, or too large ~~to~~ produce severe bleeding, unbearable pain, and extreme prostration. These poisons act on the other-systems as well, producing certain lasting effects which the people concerned do not realise until late. Nevertheless, a person will not get this treatment done on her more than once; such would be her first and only experience. Hence this method has lost all repute.

(2) **Local application of some vegetable irritant juice** is a more common practice. The white juice of the cut ends of a branch of the ***Callotropis Gigantia*** is

commonly used in India. The freshly cut end of the stick is introduced into the vagina and the cervix is touched, which part gets blistered. Uterine contractions are set up and the impregnated ovum is expelled. The defects of this method are many. The quack does not know, nor can he identify the cervix and as such often the vaginal walls and fornices are injured, and blistered. Sloughing of the parts with consequent dangers result. It is difficult to introduce the irritant and apply it properly without the aid of a vaginal speculum, which he knows not of, and so he cannot administer it effectively, except in cases of prolapsed uterus when the cervix can be seen at the vaginal orifice. Granting that he does it effectively, it is sure that the cervix will slough and become septic. Various complications, chronic endometritis, chronic metritis, cervicitis, vaginitis, occlusion of the os, menorrhagia etc., result, and the funniest thing is that none of these people will speak out about these disasters, the treatment having been done most clandestinely.

(3) **Introduction of a foreign body,** like that of a leniar stick or a thin iron wire into the cervix is not uncommonly done by quacks to induce abortion. More dangers are wrought by this method than by any other.

The dangerous effects are more sudden here, and anything might happen before she reaches doctor's hands. Many a time such sticks have been found in the abdomen, piercing the uterine wall, vaginal wall, bladder or rectum on doing prostmortems and during abdominal operations. Two interesting cases are reported in the *Clinical journal* dated Dec. 14th 1932. In one, a woman aged 38, had cessation of menses for 7 weeks. Though there was no other sign or symptom of pregnancy, she induced abortion by pushing into the cervical opening the nozzle of an ordinary enema syringe and pumping inside about three syringe-ful of hot soap water (prepared by dissolving a piece of carbolic soap in hot water). Immediately, slight bleeding and acute pain in the whole of the lower abomen occurred. Later, she had to be operated upon for pelvic abcess and it was found out that an ovarian cyst was the cause of her stoppage of menstruation, and not any pregnancy.

The other case was a woman aged 38 years, who having missed two periods, developed early symptoms of pregnancy and attempted to produce abortion by passing a crochet-hook into the uterus without any aseptic precautions, which pierced the uterine wall and disappeared.

Later it had to be operated upon and removed from the abdomen; but she died of embolism.

The quack does not know even the elementary principles of antisepsis, neither does he know the anatomy of the parts at which he operates. He cannot define the external os, nor does he know the position and size of the uterus. He simply thrusts his crude instrument up the vagina and pierces whatever structure it comes in contact. This sets up inflammation of the part; peritonitis, parametritis, etc., result; often ending fatally. Occasionally it produces sudden severe shock, collapse, and immediate death. Any amount of stress on deprecating these methods of abortion will not be too much.

The number of abortions in Paris seems to be more than the actual births. At the fifth Conference on Maternity and Infant Welfare, Dr. Berkly, the senior obstetrition at the Middle sex Hospital said:— "The importance of abortion as a cause of morbidity cannot be exaggerated, more especially when there is reason to believe that criminal abortion is on the increase in this country, as it is certainly in other Europian States. It is undoubtedly true that if statistics were available for this country we should find that criminal abortion, those of self-induced, is responsible for most of the cases of morbidity, the reasons being not far to seek".

If birth control methods are made more available to the mothers of the working class, the main cause of the prevailing high rate of abortion would be removed and maternal health greatly improved in consequence.

Dr. Elsa P. Woodrow writes in the *South African Medical Journal* dated Oct. 22nd 1932:—

"The tale of self-induced abortion with its trail of misery and ill-health, and its probable effect on maternal mortality and morbidity in later pregnancies, is a horrible reality. In 1922, it was estimated that in New York City alone there were 80000 criminal abortions annually. Margaret Sanger in the course of her nursing career, which took her into the poorest part of New York City, states, that she has seen on Saturday nights groups of 50 to 100 women going to questionable offices wellknown to the community for abortion".

Large numbers of criminal abortions are being done in India, but to get a correct account of it is impossible, all of them being done so secretly.

There are several excellent methods of inducing abortion, which any doctor can easily do. Dilatation and curreting in the proper manner is the best and least harmful of all. The ovum is usually implanted at the middle part of the anterior or posterior wall of the uterus and in the earlier stages of pregnancy, in the second month, curretting will not have a greater effect on the woman than an ordinary retained menses. Often dilatation with a medium Hegar's dilator will be sufficient. "In Russia large experience has been acquired with governmental abortions done by the hundred thousand. In each case the individual special need is studied with the result that about 60 per cent of the applicants are accepted, with a limit of the third month set, and anaesthetics omitted. They report for this hospital procedure, 5 per cent of complications and no deaths; and declare that whereas in 1924, 43 per cent of interruptions were performed by the unqualified, now only 14 per cent are in such hands."

Quinine has been largely given by mouth to induce abortion. It possesses the power of contracting the uterine muscles. Several cases in which quinine has been tried by mouth as an abortifacient have come to my notice. A large dose is necessary to get the action effective. Nothing less than 15 grains in one dose does any good. Sometimes even 30 grains are insufficient. To try with more than 20 grains is not always safe. It should be strongly suggested that nobody should use quinine to induce abortion, unless, expert medical aid is near at hand, to prevent any mischance.

X-ray is being made use of in inducing abortion. "One of the really important recent contributions to gynaecology is the perfecting of the process of inducing abortion by means of the X-ray." It is largely used in many parts of the civilised world. It is specially indicated in cases in which the usual operation of evacuation by dilatation and curretting cannot be employed with safety.

"The techniche in brief, includes catharsis the night before radiation, an enema in the morning and a restricted diet. The bladder is emptied at the time of treatment, and a vaginal examination is made to map out the uterus accurately. The treatment should be completed within two days. For two weeks usually nothing happens, then the patient has a spontaneous miscarriage. The bleeding is usually moderate, the pains controlled and in most cases the foetus and placenta are expelled, intact in the sac, in one piece. The interval between irradiation and abortion varies, may last many weeks, rarely as long as three months. Involution is rapid and the cases are hospitalised for only a few days."

An advantage with this method is that the ovaries also being exposed to irradiation, ovulation is suspended for a time after the treatment. The length of time of the amenorrhoea depends upon the age of the patient. For people under 25 years, the amenorrhoea should last for about one to two years. But for those above 35 years, it might be for ever, and thus they get sterilised if the ovaries are not guarded.

The disadvantage with" the X-ray method is that it is not available everywhere and not cheap enough for all to try.

At the annual representative meeting of the British Medical Association held at Dublin on July 21st 1933, there was a hot discussion regarding the amending of the law dealing on abortion. The reasons suggested were:—

1. The legalisation of abortion in some countries, notably Russia, had created a demand for abortion in this country.

2. Owing to the economic crisis, and possibly as an offshoot of birth control teaching, women were having more recourse to abortionists than they had done in the past.

3. The law is uncertain on this point and Juries hesitated to commit themselves upon it.

The meeting decided that the matter should receive further consideration by the Council.

Dr. A. J. Rongy, M. D, F. A. C. S., has recently published a book "Abortion—legal or illegal." He says that in United States it is estimated that two millions and in Germany over a million abortions are being performed annually—the great majority of them by unqualified persons—with consequences disastrous for the women. At a time when religious and moral inhibitions, which in the past held the practice in check are rapidty losing power, and when economic conditions are especially unfavourable to the rearing of a large family, it is reasonable to expect the number of abortions to increase rather than diminish. If therefore, argues Dr. Rongy, we purge our minds of religious and other preconceptions and adopt a purely medical approach to the issue, the problem before us is whether or no we can reduce maternal mortality and morbidity by extending conditions which justify abortion. He includes all sorts of illegitimate pregnancies to be permitted legally, at their option to have abortion as a matter of choice. How this sort of legalisation would be suitable in India, I leave to better minds to judge.

CHAPTER XII.

Conclusion.

After having discussed the various methods of preventing conception, I shall try to impress upon the reader the extreme necessity of following these methods, by citing some of the facts that drive us to patronise contraception as the only remedy.

There is an opinion current that the use of contraceptive methods will lead to a declining population. A portion of the speech made by Dr. E. F. Griffith at the Birth Control Conference in London on the 8th July, 1933, may be cited in this connection. "Knowledge of contraceptive methods did not necessarily mean a declining population. Where less than two years intervened between births, the chances of the life of the infant were almost halved in comparison with those born after two years or more. Obviously the survival-rate was the important factor. In Holland where the knowledge of contraception had been easily obtainable for the past 40 years, the survival rate had gone up and the population was increasing. The incidence of venereal disease and abortions had decreased, and the marriage age was appreciably younger. National birth control had its place in preventive medicine in the same way as antenatal and postnatal work. Improvement of the maternal mortality might be brought about when the debilitated who crowded the antenatal clinics were prevented from having a superabundance of children."

There is no point in getting a large number of children, if many of them are to die away within the first few days or months of their birth.

Infant mortality is increasing in British India, from the year 1927 onwards, as is shown in the census report of 1931.

Infant mortality rates per 1000 live births

1927.	....	166·93.
1928.	....	172·94.
1929.	....	178·39.
1930.	....	180·83.

At the same time it seems to be steadily decreasing in the big cities, where much of antenatal care, infant welfare work and birth control propaganda are being largely done, though comparatively the rates in towns are higher than in those of rural parts, which is on account of the healthy condition of the country parts.

Infant mortality rates per 1000 live births

	1927.	1928.	1929.	1930.
Bombay	316.	314.	301.	298.
Calcutta.	340.	276.	249.	268.
Madras.	240.	299.	259.	246.
Rangoon.	294.	341.	321.	278.
Lahore.	201.	204.	214.	187.
Delhi.	201.	210.	259.	199.
Nagpur.	254.	299.	291.	270.

The infant mortality in some of the Europian cities may be compared.

London.	71·0	per 1000	live births,
Paris.	93·0	,,	,,
Berlin.	82·0	,,	,,

From this it is clear that in India where birth control methods are least known and used, infantile mortality is three times higher than in places where they are publicly taught and largely used. The chief causes of infant death in India are infantile debility and premature births. We shall see how these conditions are caused.

1. Small spacing of children is one of the most important causes of infant debility and premature births. Short intervals between and immoderate production of children, weaken the health of the mother which also seriously affect the health of the children, and they do not get the necessary attention to their proper development.

The statistics of several women of this place who had more than six pregnancies and selected from the several classes of people have been collected. It is found that the infant mortality rate among them is 479 per 1000 live births, while in Travancore as a whole it is 120. It is also found that the number of deaths among infants is directly proportional to the number of pregnancies in each person and inversely proportional to the space between births.

TABLE I.

No. of children in the family.	Infant mortality rate
7.	390.
8.	410.
9.	428.
10.	460.
11.	600.
12 & above.	620.

TABLE II.

Space between two successive births.	Infant mortality rate.
1 year.	757.
1½.	603.
2 years.	518.
2½.	204.

The following tables prepared by the Children's Bureau of the Department of Labour in United State's, quoted in the *Indian Medical Gazette* may be compared, with that of ours.

TABLE III.

No. of children in the family.	Infant mortality rate.
4 and less,	118.
6.	267.
7.	280.
8.	291.
9.	303.

TABLE IV.

Interval between births.	Infantile mortality rate.
1 year.	147.
2. years.	98.
3. ,,	86.
4. ,,	86.

These figures speak for themselves. They also indicate how spacing ought to be adjusted.

The death-rate of infants increases with the order of births. The following tables taken from the American report clearly indicate the fact.

TABLE V.

Order of birth.	Infant mortality rate.
1st and 2nd born.	135·3
3rd and 4th born.	143·2
5th and 6th born.	177·0
7th and 8th born.	181·5
9th and 10th born.	201·1

TABLE VI.

	Infant mortality rate.	Percentage of still births to live births.	Children alive per 1000 Pregnancies.
5 Pregnancies and under.	226·3	12·5	633·7
6 Pregnancies and over.	272·2	20·9	504·4

2. Pregnancy at an early age, is another cause, especially in India where early marriage is very common, and contraceptive principles are not usually adopted. Early pregnancy does not permit the child to grow to its proper size, the pelvic cavity of the mother having been not developed to its full size to hold a normal child. Hence the child grows week and either it is born still, or it dies not many days after birth. Mr. Sorley reports about the ratio of still births

to live births as 33·5 per cent in the city of Bombay in 1930. But, our investigation in this place gave only a ratio of 21·2 still-births to 100 livebirths. And, it must be remembered that our inquiry was among select-women who had more than six deliveries. The census report of Travancore, 1931, gives the percentage of still-born to live births as 3·8. A low rate indeed, and in Madras it is 5%.

The American Table given below is instructive.

TABLE VII.

Age of mother.	Infant mortality rate.
Under 18	160·3
18—20.	121·9
20—24.	109·5
25—29.	101·4
30—34.	104·7
35—39.	126·5
40—44.	131·3
45 and over	250·0

3. Pecuniary deficiency (poverty) of the parents, is not an uncommon cause of child-mortality, especially among the lowclass people, their income being comparatively low and the methods of preventing conception being unknown to them. Ninety per cent of the cooly classes in India do

not get an income above annas four a day and the average gets only 2 annas a day and with that how can a family of seven or eight be fed? The average number of children in a family in Travancore is 6·5, though in British India as a whole it is a little less. A walk round the cooly lines in an estate, or among the low class people of the country parts, will clearly present the sad spectacle of waning children, weak, debilitated, who are all but skin and bones. Inquiry into their history will reveal that many of them look much below their actual ages, and most depend for their maintenance on the charity of their better-placed neighbours. The table given below showing the condition in America is worth noting.

TABLE VIII.

Earning of father in dollars.	**Infant mortality rate.**
Under 400	170
450 to 549	130
550 to 649	120
650 to 849	110
850 to 1049	90
1050 to 1249	70
1250 and over	60

I am sorry that I could not prepare a similar table to show the condition in India, with all the statistics that have been collected by the various census commissioners.

4. Veneral diseases, largely contribute to the mortality of infants. It may be affirmed that many of the methods of contraception effectively prevent venereal diseases as well.

The high mortality rate of the infants can be much reduced by educating the people and making them follow the appropriate contraceptive methods, so that proper spacing between successive children may be effected.

(2) Maternal mortality.

In spite of the increase of hospitals and obstetricians with advancement in the methods of conducting difficult and complex labour cases, maternal mortality is not proportionately decreasing. Many of the causes that increase the fatality in children apply to those of mothers as well.

The report of an investigation into the causes of maternal mortality in the City of Madras, by Dr. A. Lakshmanaswamy Mudaliar, recently published, is an invaluable record. He has brought out many facts which is worth the attention of all those who take interest in maternal welfare. The maternal mortality rate in Madras is 16·6 per 1000 live births and this seems to be appalling when compared with the rates in other countries, and it must be remembered that he inquired after the details of 436 cases of maternal deaths in bringing out conclusions.

Madras.	16·6	Denmark.	2·6.
Norway.	2·8	England.	4·0.
Switzerland-	4·4	Germany.	5·1.
Australia.	5·5	Belgium.	5·6.
France.	2·5	Holland.	2·4.
Italy.	2·8	United States.	8·3.
Ireland.	4·8	Japan.	2·8.
Scotland.	6·6	Sweden.	2·6.

The figures for the different parts of India, or India as whole are not available. To get correct statistics of such deaths in the rural areas in this country is almost impossible. But it may be surmised that if in the City of Madras, where expert medical aid and antenatal care is granted free to all, the maternal.death rate is so high, it should be much higher in the rural areas where such helps are not available.

An excellent classification of the causes of maternal deaths is given in the report, a study of which clearly shows that about 20 per cent of the deaths can be prejudged, and as such prevented by advising control of pregnancy or induction of labour. The chief such preventable causes of death are diseases such as: tuberculosis, anaemia, heart diseases and kidney trouble.

Next to these comes the short spacing between births. Then there are other causes such as pregnancy in girlhood and poverty.

Dr. Mudaliar says, "The analysis of the history and end-results of multiparity go to show that too frequent childbirth seriously impairs the vitality of the individual, if the interval between successive child-births is very limited. Even in the absence of any definite factor or pathological entity, the patient runs a grave risk at the time of delivery. It may be a condition of hypopiesis, or hypo-vitaminosis or hypoadrenalenema, or perhaps a combination of two or three factors. The following cases are illustrative of the condition referred to:—

1. Sixth pregnancy, age 30, had six children within a period of eight years, the last child born a year ago. She was admitted in labour of 18 hours duration. The condition on admission was fair; blood pleasure 95 m. m. vertex presenting. The child was helped with forceps. The patient died two hours after delivery from shock.

2. Eighth pregnancy, age 25, has had seven children in the course of seven years: previous deliveries—five natural and two by forceps. Mother in poor state of health, ill nourished; child helped with forceps; patient collapsed suddenly and died within half an hour.

"Cases of this description are not infrequent and whether the labour is terminated by natural forces or aided by instruments, the lack of vitality of the patient consequent upon the frequency of child-birth within a limited period seems to favour a sudden collapse either soon after delivery or in the first few days of the puerperium.......... The problem of reducing maternal mortality in multipara is a little bit more complicated than in a primipara. While antenatal supervision may play a large part in reducing the incidence of mortality in primiparae, it is necessary to realise that in multiparae other factors also are needed........... What form of advice this should take, and whether it is at all justifiable or necessary in antenatal clinics to offer advice which will really be practicable, is a consideration that has to be borne in mind. Contraception, from this point of view of the prevention of maternal mortality, seems undoubtedly to have a place in the scheme of things for the promotion of maternal welfare."

Unfortunately, as the interval between births of the different mortality cases in the several multiparae, is not given in the report, the percentage of deaths due to the different intervals cannot be calculated.

Pregnancy in girlhood often necessitates instrumental delivery or caessarian section, to bring out the child through the undeveloped passages of the girl's pelvis, which increases the risk to her life. The Madras statistics show that about a third of the deaths during labour occur in those who are below 15 years of age.

Age period.			Death-rate per 1000 confinements.
Under 15.	....	....	46·51.
15 to 19.	....	....	23·74.
20 to 24.	....	....	17·91.
25 to 29.	....	....	14·30.
30 to 34.	....	....	13·92.
35 and above.	....	....	14·06.

This clearly shows how far early marriage affects maternal deaths.

Pecuniary deficiency of the family to attend properly to the health of the pregnant woman is another cause of her deterioration in health. Further, for want of money they do not get the expert aid of trained midwives and doctors during labour. It is not seldom that doctors get labour cases in very poor houses, where they see gasping women vainly attempting to expel the foetus with feeble strength and feeble pains; not uncommonly terminating in the death of the mother as well as the baby. Had it not been for an empty or a lean purse, they would have called in the expert earlier, or removed the woman to the hospital. A correct statistics of such deaths, though difficult to prepare, will show the enormous rate of maternal deaths on account of this cause.

The summary of the tables given in the Madras report regarding this point may be noted.

1. Maternal mortality in relation to sanitation.

Areas in which they live.	Percentage of Maternal deaths.
Bungalow areas,	1·6.
Fair	9·8.
Poor.	29·8.
Dirty.	25·7.
Cheri	6·3.
Outside the city.	17·0.

2. Maternal mortality in relation to the size of the house.

Houses.	Percentage of Maternal deaths.
Bungalows.	1·4.
Separate house.	9·8.
Three rooms.	11·92.
Two rooms.	16·74.
One room.	31·4.

3. Maternal mortality in relation to the Standard of living—Income.

Income.	Percentage of Maternal deaths
Rich (above Rs. 500)	0·5.
Well to do (200 to 500)	1·2.
,, ,, (100 to 200)	2·8.
,, ,, (50 to 100)	7·0.
,, ,, (20 to 50)	41·2.
Poor (below Rs 20)	30·3.

These figures speak for themselves and needs little comment.

The necessity for adopting contraceptive methods is being recognised all over the world. The late Hon. Justice Mc Cardie, the famous British bachelor Judge, who became notable by warning while in the bench, the witness in a criminal abortion case of her getting implicated if she spoke in favour of the prosecution, delivered the Galton lecture at the Anniversary dinner of the Eugenics society, in London and remarked:—

"When I look at Europe I see in certain regions a growth of population so serious as to presage an out-pouring which may lead to appalling conflict. If the nations cannot control their population they will not be able to control the outbreak of war".

"Birth control will, I hope, become in due course one of the greatest agencies for the furtherance of international peace through international co-operation."

This opinion can be fully endorsed. If the big-wigs in England fear that they are to be threatened with over-population, how much more should it be in India, where the increase of population is twice that of in England during the last decade.

We doctors, meet with all sorts of people in distress, and it is not often possible to restrain or sustain the feelings when our hearts get moved or weakened by the wailings, especially at the implorations of the fair sex.

"Please doctor, tell me the easiest and the best methods of preventing pregnancy," is a common question put by many an ailing female patient. A difficult query to be answered in one sentence! Over 60 methods of control of conception have been described in this book, and the merits and demerits of each are discussed. The readers can very well select whichever they think best for them. All the methods may not be suitable for each and every one.

Simplicity, security, protection for long time, scope for full enjoyment, absence of physical injury and assurance of return to fertility, must all be combined together in the best method of contraception. A combination of methods might satisfy all these conditions. But the selection depends upon many things, the health of the couple, strength of their purse, position of the organs in the female, duration of the orgasm in the male, and various other factors.

The easier and the more practical methods may be summed up, to the advantage of the lay reader.

The surgical methods are the surest of all. The risk and difficulty of undergoing an operation dissuade many from getting them done. If sterlisation in the male alone is enough, vasectomy is the easiest and the best, in which risk and ill-effects are nil and success is cent per cent. But if one desires to have a child in later life, it may not always be possible, as reimplantation of the divided vas may not be successful in all cases. Further, if the wife goes astray, there is chance of her getting pregnant. Some time back, after the difficult delivery of a woman, her husband requested me to sterilise her so that she may not have a recurrence of the risk of such a labour. Vasectomy was suggested to him as the easiest and surest method, explaining all the advantages of sterilising him. He resented, saying, that if she goes astray his family might be bulked with intruders.

"Well this is the best way to test your wife's chastity," said I. "Of course it is", replied he. "But, when once I find that my wife is not faithful, all my life's happiness dwindles down to dust and why should I drive myself to such a hopeless condition". Not having been able to persuade him to vasectomy, I successfully tried, immunisation on his wife. (See pp. 166, 174)

Vasectomy is the best for those who have had already enough number of children and do not care to have more, and those whose wives are so unhealthy as to undergo the strain of pregnancy. After this operation they both can enjoy well without any loss of the man's vitality. One of my patients after this operation said that he found it as easy as the extraction of a tooth by an expert dentist.

In the female, surgical sterilisation is done only during some other abdominal operation on the person. In the *Practitioner* of September 1933, Dr. E. A. Barton cites a woman who delivered six times after she had been assured by an eminent surgeon that both her fallopian tubes have been sutured and he had rendered her sterile.

Coitus interruptus, though the most largely adopted method in Europe, ought not be made a constant practice, as it produces a deleterious effect on the nervous system. But it may be tried once in a way during emergencies. It is possible only for those who can control the orgasm for some time.

The methods described in chapter VI are fairly satisfactory, though not absolutely sure. It entails no cost and may be practised by every body except those who are diseased. The comfort loving rich may not like the idea of getting up from cosy beds and exert themselves especially after coitus. The poor working classes can combine this method with washing of the parts with decoction of neem or tamarind leaves if possible, and ensure 75 per cent success, with little expenditure. The washing is to be done in the position like the Chinese way of squatting, and cleaning the cervix and fornices with the fingers. In fat people this may not be satisfactorily possible.

Heating the scrotum is an easy method which may be adopted by the poor as well as the rich, as it needs no expense. If it is done properly once in a way, one can be almost sure of the effect, though it is not yet time to give conclusive opinion on it. As the effect lasts only for about three months, it would be enough if the heating is stopped when you want to be fruitful.

Smearing of honey, alum jelly or neem oil mixture, are excellent methods of contraception. They are cheap, of easy technic, pleasant lubricants, enhancers of enjoyment, sure in effect, and may be ranked first-rate among contraceptives. They are available everywhere in India and can be used by all classes of people. If properly smeared to cover the cervix and the fornices, they give cent per cent success.

All the mechanical methods have the disadvantages of introducing a foreign body into the vagina, by which the sexual enjoyment is a bit diminished. But many of them are very popular in the civilised world. Among them, the male sheath or condom and the caps are the most used. Both variety are costly, troublesome, not of any easy technic, and often not sure of safety. The vaginal diaphragm too is largely used, but it dilates the posterior part of the vagina and diminishes the tightness of that part over the penis, during coitus. A sheath is not suitable for one who has a weak erection. One who has great vigour during action might tear the sheath or displace the cap or the diaphragm. Hence in such people these are not suitable.

Introduction of half a piece of lime is a fairly satisfactory method and may be used during emergency. Introduction of cotton ball dipped in some contraceptive solution is cheap and very effective. Vinegar or alum solution or decoction of neem or tamarind leaves may be used for this purpose.

For reasons already stated, intrauterine methods are to be deprecated. Grafenberg ring is the only one worth trying, and even that is not possible for ordinary folks.

Vaginal douches are suggested by many doctors. But on account of its laborious technic, dearness, uneasiness, want of privacy, and unsure effect, it is not to be recommended. The difficulty of getting 'up at the time, alone will dissuade anybody from adopting it.

Salt solution is a household remedy, just as vinegar or soap and may be used for washing the parts with some success. It is available even in the poorest house and will be within hand at any emergency.

I am averse to people using, patent drugs as contraceptives, as most of them are not properly experimented and found beyond reproach. The originators of each such patent, speak highly of it and on most occasions they buy up some medical man's opinion or newspapers to extol their drugs.

Before closing, I shall note down the different contraceptives in the order of their merit as are suitable to the different classes of people.

Those which are suitable for the low class people.

1. Heating the scrotum.

2. Introduction of a piece of cloth or cotton dipped in salt solution or decoction of neem or tamarind leaves.

3. Introduction of a half-piece of lime dipped in one of the solutions given above.

4. Physical exercises together with washing the parts in one of the solutions given above.

For the middle classes.

1. Heating the scrotum.

2. Smearing of honey, neem oil or alum jelly in the vagina. •

3. Vasectomy.
4. Immunisation.

5. Sponge or cotton dipped in decoction of neem or tamarind leaves, alum, soap, salt or vinegar solutions.

For the high class.

1. All the methods given for the middle class people.

2. X-ray therapy.

3. Soluble pessaries.
4. Caps.
5. Sheaths.

Finally; I would bring to the notice of all who read this, that the simple methods are more effective and surer than the costly artificial contrivances. At the same time it may be confessed that all of us have a mania for the costly and fashionable ones, however useless they may be.

Great controversy is going on in the papers and the platforms in many parts of India regarding birth control propaganda. A number of old world orthodox people, ascetics, Celebate priests of the Roman Catholic Church and hypocrites rally against it; while, all right-minded and well-thinking people support the movement. I would request the readers of this book to view the matter from a rational point of view, with an unbiassed mind and accept or discard it according as their consciences would permit.

लाल बहादुर शास्त्री राष्ट्रीय प्रशासन अकादमी, पुस्तकालय

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